Flite 116–G200
Easergy Wireless Communication Indicator

User Manual

46010-501-01
09/2011

Retain for future use.

Schneider Electric

Hazard Categories and Special Symbols

Read these instructions carefully and look at the equipment to become familiar with the device before trying to install, operate, service or maintain it. The following special messages may appear throughout this bulletin or on the equipment to warn of potential hazards or to call attention to information that clarifies or simplifies a procedure.

The addition of either symbol to a "Danger" or "Warning" safety label indicates that an electrical hazard exists which will result in personal injury if the instructions are not followed.

This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

⚠ DANGER

DANGER indicates an imminently hazardous situation which, if not avoided, **will result in** death or serious injury.

⚠ WARNING

WARNING indicates a potentially hazardous situation which, if not avoided, **can result in** death or serious injury.

⚠ CAUTION

CAUTION indicates a potentially hazardous situation which, if not avoided, **can result in** minor or moderate injury.

CAUTION

CAUTION, used without the safety alert symbol, indicates a potentially hazardous situation which, if not avoided, **can result in** property damage.

NOTE: Provides additional information to clarify or simplify a procedure.

Please Note

Electrical equipment should be installed, operated, serviced, and maintained only by qualified personnel. No responsibility is assumed by Schneider Electric for any consequences arising out of the use of this material.

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Section 1—Introduction

General Notes

Flite 116/116-SA wireless sensors are used to provide current measurement and line fault indication to a SCADA system. The G200 (a wireless communication indicator hub) is used with the wireless sensors to report the data on a long-range level.

The G200 is available as:

- a standalone unit powered by either solar cell or through a 110/230 Vac line, or
- an OEM part to be integrated inside an existing control cabinet, that is fitted with a remote terminal unit (RTU) for connecting the outputs of the G200 (dry contact output relay and/or RS232 interface).

This user manual describes each component (the G200 and Flite units) and how to install and commission them.

NOTE: The G200 is linked to other applications that are not described in this document.

Please note that some features requested by and developed for OEM customers may not appear in this manual. This document describes the standard product version.

Product References

To order a product with the correct reference, please refer to the commercial brochure or to your local Schneider Electric representative.

In this document, the G200 is referred to as:

- G2PF (large sized enclosure)
- G2GF (medium sized enclosure)
- G2SF (card version with an IP21 enclosure)

NOTE: In this user manual, models Flite 116 and Flite 116-SA are both referred to as Flite.

NOTE: The G200–DNP 3.0 User Manual (NT00081-04) provides more detail regarding the DNP 3.0 implementation for the G200 RTU.

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Section 2—G200

Introduction

The G200 is available in the following versions:

- **G2PF:** As a standalone unit, large IP54 (NEMA 3) cabinet, powered by LV input
- **G2GF:** As a standalone unit, medium IP54 (NEMA 3) cabinet, powered by solar cell panel
- **G2SF:** As a card, fitted inside a small IP21 (NEMA 1) cabinet, for integration in an existing remote control cabinet

Functions

G2PF

The G200 performs the following functions:

- **Dialogue with Flite fault indicators** via a bi-directional short-range high frequency (HF) radio link
- **Monitoring** for remote indication and/or local display of the following information:
  - Fault current path, for both short-circuits and ground faults
  - Medium voltage loss/return alarms
  - Average load current
  - Medium voltage availability
  - Flite low battery alarm
  - Flite communication failure alarm
- **Communication with the remote control supervisor:**
  - Use of DNP 3.0 protocol
  - Management of data communication devices
- **Recording of time stamped events as they happen** (20 ms accuracy) These events may be downloaded onsite to a laptop PC with a local connection
- **External power supply:**
  - 6/12 Vdc (G2PF, G2GF, and G2SF)
  - 110/240 Vac with internal backup battery (G2PF)
  - Solar cell panel fitted with 6 Vdc–10 A/h backup battery (G2GF)

G2SF

G2GF

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General Specifications

Table 1:   General Specifications

Flite communication			
Management	Number of Flite 116 units per G200		1–9
Short-range radio	Frequency used		918–919.2 MHz with frequency hopping
	Standard compliance		FCC part 15.249 and AS/NZS 4268:2003
	Maximum distance to G200		328 ft (100 m)

Electronics			
G200 card power supply	Requested voltage		+ 6 Vdc
	Requested power supply for RS232 interface		26 mA
	Requested power supply for GSM/GPRS interface		• 40 mA in standby • 0.8 A upon GSM communication • 300 mA upon GPRS communication

Cabinet characteristics			
Electromagnetic compatibility	Electrostatic discharges	IEC 1000-4-2	Level 4 (8 kV on contact)
	Electrical fields	IEC 1000-4-3	80 MHz–1 GHz– 3.05 V/ft (10 V/m)
	Radio frequency in MC	IEC 1000-4-6	0.15 MHz to 80 MHz–10 Vrms
Climatic specifications	Operation temperature	°F (°C)	• All versions: -13 to 131 °F (-25 to +55 °C) • G2PF: -40 °F (-40 °C) on request
	Storage temperature	°F (°C)	All versions: -13 to 158 °F (-25 to +70 °C)
Mechanical specifications	Dimensions and weight	H x W x D in. (mm) lbs (kg)	• G2PF: 17 x 13 x 8 in. (430 x 330 x 200 mm)—18 lb (8 kg) without battery / 24 lb (9 kg) with 2 Ah battery • G2GF: 11 x 8 x 4 in. (270 x 203 x 110 mm)—3.3 lb (1.5 kg) • G2SF: 10 x 6 x 2.5 in. (250 x 150 x 65 mm)—2 lb (1 kg)
	Protection	IEC 60529	• G2PF: IP54 (NEMA 3)—IK9 (impact resistant) • G2GF: IP54 (NEMA 3)—IK9 (impact resistant) • G2SF: IP21 (NEMA 1) (IP54 as an option)

SCADA communication			
Protocol (*)			DNP 3.0 Serial and TCP/IP, Modbus Serial and TCP/IP, IEC 101
Long-range communication	Embedded interface	RS232	• G2PF and G2SF: standard • G2GF: on request
		GSM	• G2PF and G2SF: on request • G2GF: standard
		GPRS	• G2PF and G2SF: on request • G2GF: standard
	External device [1]	G2PF	PSTN, GSM, GPRS, or radio
		G2GF	No (either embedded GSM or GPRS modem)
		G2SF	Optional

1   Please contact your local Schneider Electric sales representative for more information.

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G2PF

Principle of Operation

Figure 1:   G2PF—Principle of Operation

Flite units 1–9

918 MHx Radio Link

Customer laptop
(for local
configuration)

918 MHz license-free
short-range radio module

RS232
interface

915 MHz license-free
short-range radio
module

RS232
interface

External
modem

Radio, leased lines, PSTN, GSM,
GPRS (*) or CDMA (*) networks

Backup battery

110/230 Vac
power supply

6/12 Vdc power
supply input

Dry relay
output
contacts

Free digital inputs

LV power supply

SCADA

Product Description

Figure 2:   View from the Bottom of the Enclosure

Short-range radio antenna
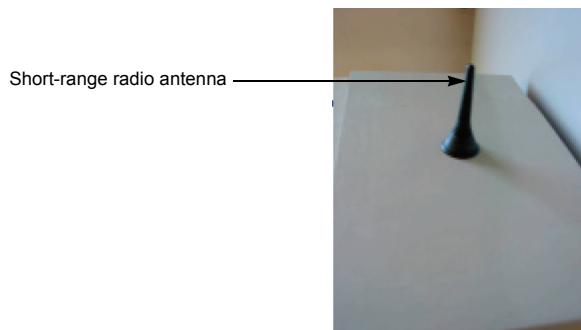
Figure 3:   View from the Back of the Enclosure

Pole attachments provided for different poles

Figure 4:   Top View

Pole attachments provided for
different poles

Figure 5:   Bottom View

Reserve

Cable gland for mains
power supply cable

Cable gland for long
range communication
cable

Ground link
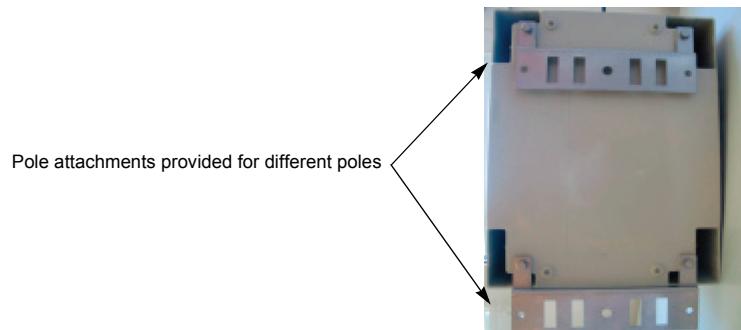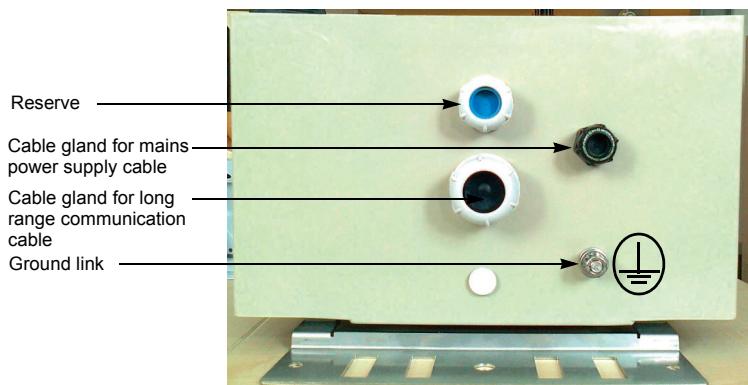
Figure 6:   AC Version—G2PF Components

Short-range antenna

Short-range radio daughter card

GSM/GPRS daughter card

6 digital inputs/3 relay outputs connection

G200 motherboard

Battery location

LV insulation transformer

R232 telecoms interface

Configuration port

GSM antenna cable

Mains power fuse

Ground lead (factory installed)

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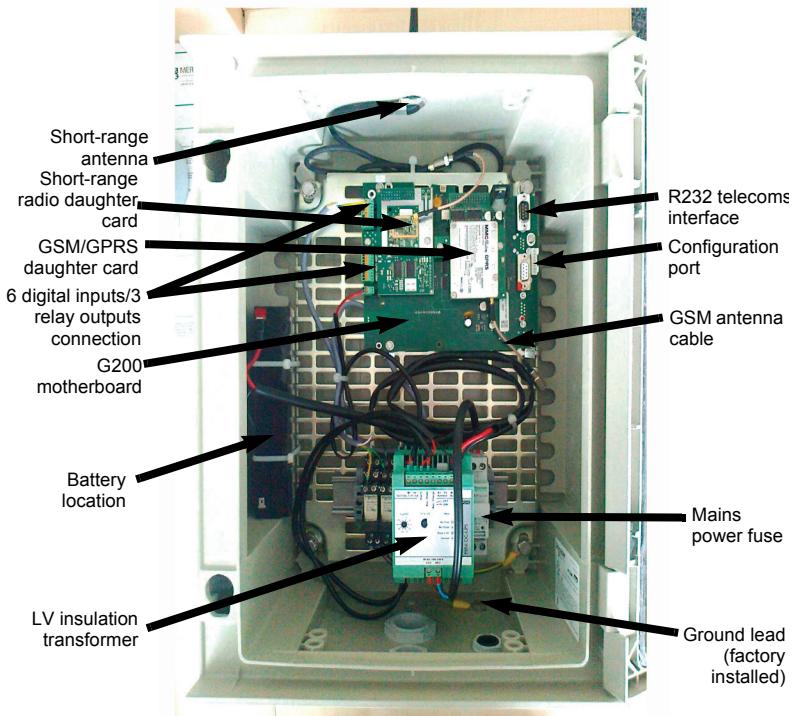
Electrical Specifications

AC Supply Version

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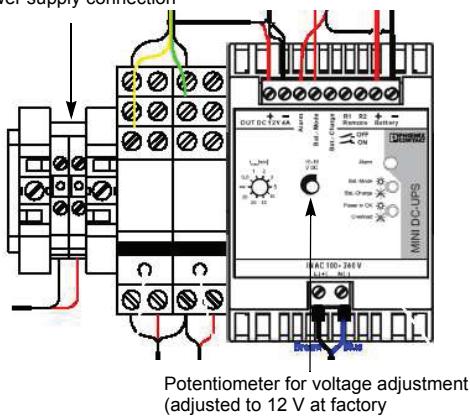
LV Supply Characteristics

- 85 Vac to 264 Vac, 50 Hz and 60 Hz
- Current consumption max.: 0–65 A (230 Vac), 1–35 (120 Vac)
- LV input protected by HPC fuse, 4 A rating, type gF, dimensions .40 x 1.50 in. (10 x 38 mm)
- Screw connection

LV Monitoring

- The power supply stops to supply the G200 unit if the LV supply absence exceeds the battery backup time. Following a failure, the equipment power supply is automatically restored when the LV supply returns.
- The mechanical ground is connected to either the 0 volt or the electrical ground of the assembly.

DC Voltage Supplied

- From the AC supply, the Phoenix LV transformer supply a 12V DC voltage between 10 Vdc to 16 Vdc (or 13.6 Vdc to 9.6 Vdc if power is supplied by the battery, and in this case, the voltage depends directly on the voltage on the battery)
- Adjustment of the output DC 12V voltage is made at factory by a potentiometer on the LV Phoenix transformer and doesn't need to be changed.
- Protected by a 3.15 A slow blow fuse (internal)
- Output current 4 A is provided (7 A in peak)
- When the AC supply voltage is lost, a relay output "Alarm" is activated
- If the supply voltage fails, the output voltage is supplied by the battery without any interruption

Terminal blocks for modem power supply connection

Potentiometer for voltage adjustment (adjusted to 12 V at factory

Power Supply Monitoring

Two digital inputs are used to indicate presence of failure regarding the power supply:

- **DI 1** : This digital input is activated when AC supply is lost. (ON status = voltage presence, OFF status = voltage absence).
- **DI 2** : This digital input is activated when a battery fault is detected (see battery characteristics section below)

Telecoms DC Supply for External Modems

- Voltage between 10 Vdc to 16 Vdc (or 13.6 Vdc to 9.6 Vdc, if voltage is supplied by the battery, an this case, the voltage depends directly on the voltage of the battery)
- Two terminals blocks are available to connect the power supply for an external modem or a radio

Battery Characteristics

- Lead battery (sealed), maintenance free
- 12 V/2.1 Ah
- Charging time: 3 hours
- Lifetime: greater than three years

- Backup time: one hour (depends on the kind of transmission)
- Automatic failure of the equipment power supply (in the event of total discharge)

Battery Monitoring

- Battery management is optimized, temperature is compensated for charging the battery in order to increase the battery lifetime
- Voltage on the battery is checked permanently. When the voltage on the battery is less than 10.2 Vdc, an alarm is activated ("Battery mode" LED on LV transformer is on, "Alarm" LED is on, and output "alarm" = 12 Vdc)
- If the voltage on the battery drops to 9.6 V, due to a complete discharge of battery, the G200 switches off and remains switched off. The device is switched on automatically **only** after recovering the power supply.
- A battery test is performed regularly. If the battery test result is wrong, an alarm is activated ("Battery mode" LED is off, "Alarm" LED is on, and output alarm = 12 V)
- When the battery is charging, the "Battery mode" LED is flashing

I/O Wiring

Figure 7:   I/O Wiring

Three digital outputs

Six digital inputs
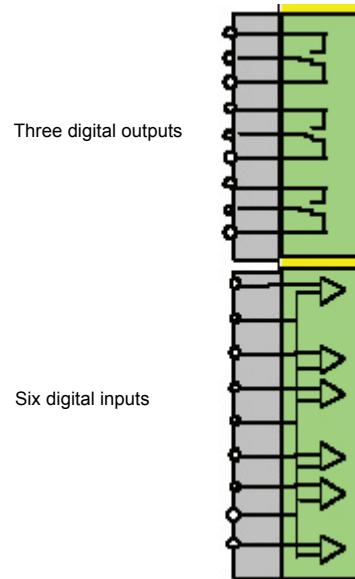
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G2GF

Principle of Operation

Figure 8: **G2GF—Principle of Operation**
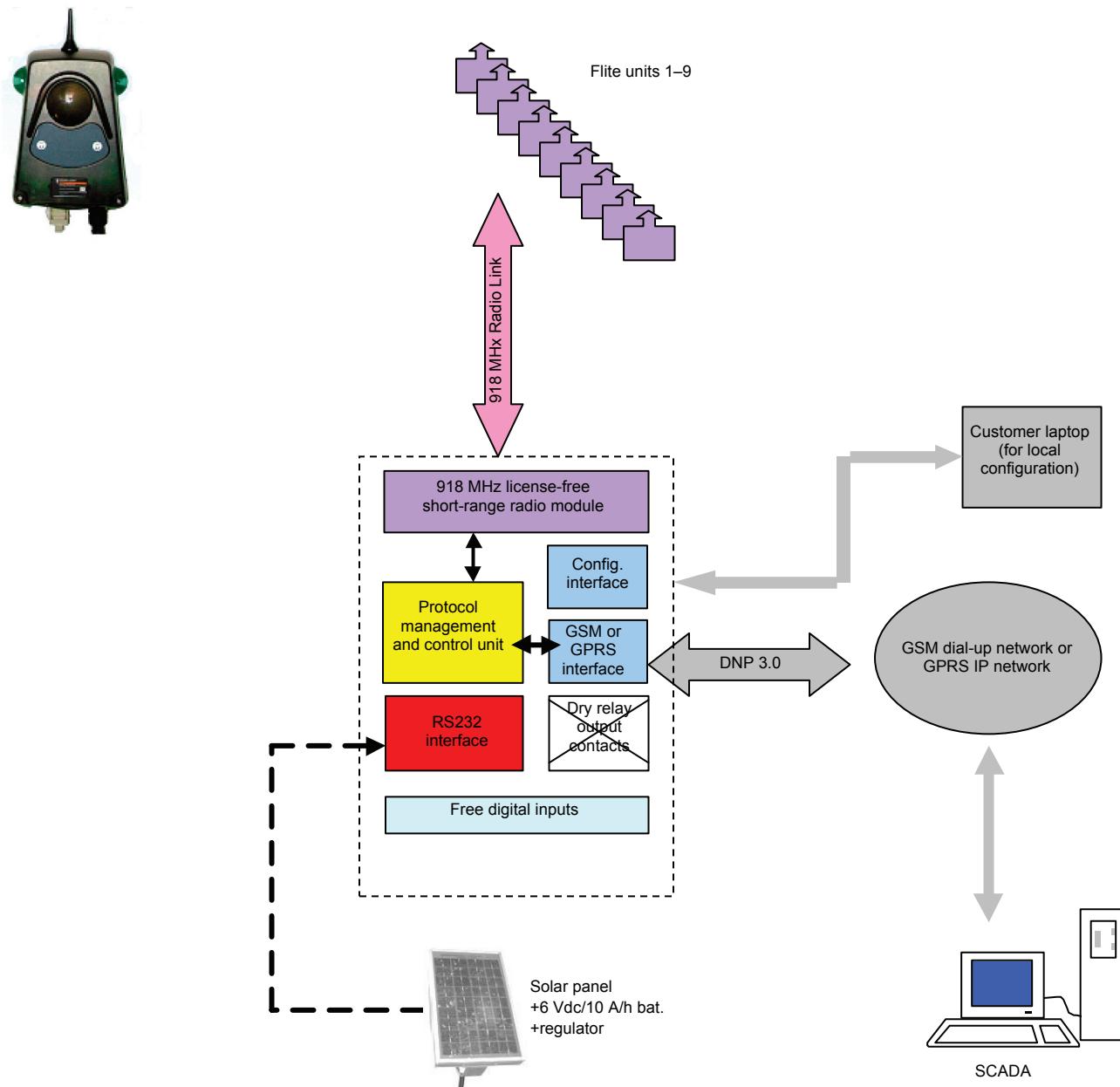
Product Description

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Figure 9:   G2GF—Product Description

Not used

Short-range radio
antenna connector

Embedded GSM or
GPRS modem

Short-range radio
module

Six dry contact inputs

Spare RS232 local configuration port
(use standard RS232 cable)

Firmware (EPROM, below
the modem)

6 Vdc power supply (+ on the right)

Three dry contact outputs (not active)

RS232 local configuration port
(HARTING plug, use specific
G2GF configuration cable)

Dimensions   Height x Width x Depth: 11 x 8 x 4 in. (270 x 203 x 110 mm)

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Electrical Specification

Figure 10:   I/O Wiring

Three digital outputs

Six digital inputs

NOTE: Digital outputs are not active.
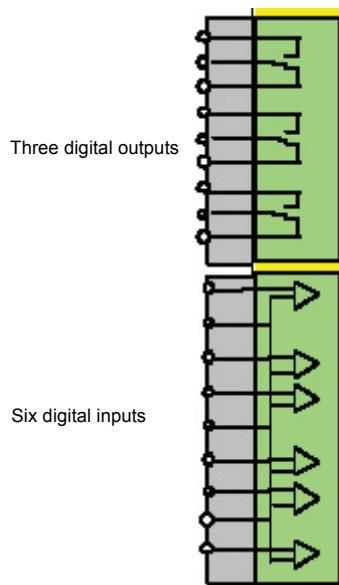
- The G2GF is fed from an external 6 Vdc power supply powered by a solar cell panel, which is fitted with its own backup battery (optional model no. GS612-10W)

- G2GF uses 40 mA when the GSM/GPRS interface is in stand-by mode

- During GSM/GPRS communication, consumption climbs to 0.35 A when the GSM reception level is correct; it may hit 0.8 A if the GSM reception level is low

G2SF

Principle of Operation

Figure 11:   G2SF—Principle of Operation

Flite units 1–9

918 MHx Radio Link

918 MHz license-free short-range radio module

Config. interface

Protocol management and control unit

RS232 interface

6/12 V DC power supply input

Dry relay output contacts

#1 Fault alarm 1
#2 Fault alarm 2
#3 Fault alarm 3

Free digital inputs

#1 #2 #3 #4 #5 #6

Customer laptop (for local configuration)

DNP 3.0

Customer RTU

Digital output may be set to:
· MV fault line #1, 2, or 3, or
· MV fault on any line, or
· Flite communication failure, or
· Flite battery failure

Product Description

Distribution networks are sometimes fitted with remote controlled overhead MV load break switches, which are not fitted with a fault indication feature and/or load current measurement. G2SF offers the possibility to upgrade the switches with these functions.

Figure 12:   G2SF—Product Description

- RTU communication (RS232 in DB9 and RJ45 outputs)
- RS232 PCB interface
- Short-range radio
- Optional short-range radio antenna
- 6 digital inputs
- Local configuration (DB9 and specific interface)
- G200 motherboard
- 6/12 Vdc power supply
- Three dry relay outputs
- Enclosure
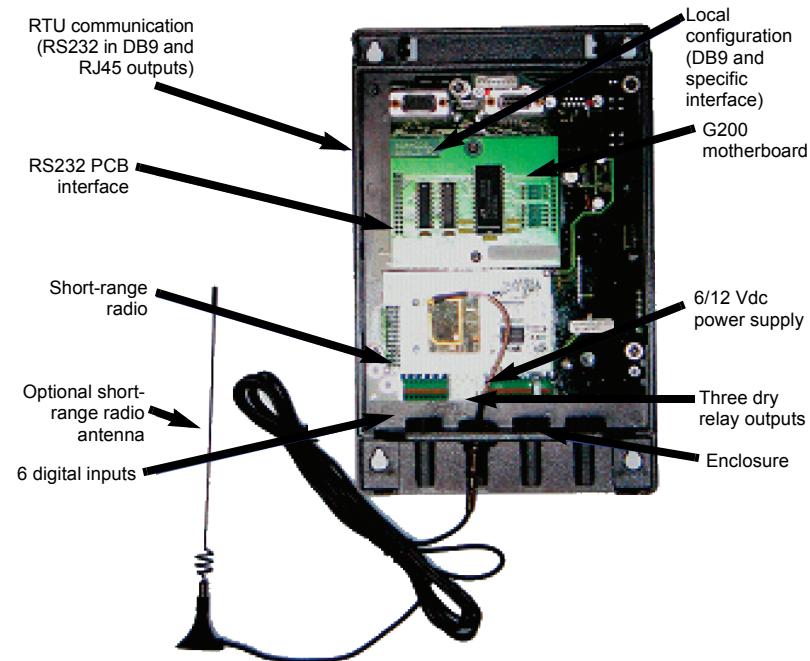
Electrical Specifications

Figure 13:   I/O Wiring

Three digital outputs

Six digital inputs
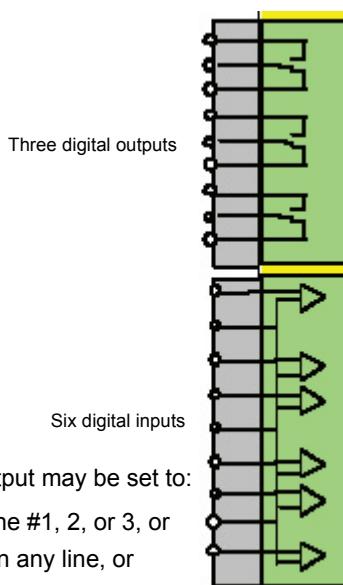
The digital output may be set to:

- MV fault line #1, 2, or 3, or
- MV fault on any line, or
- Flite communication failure, or
- Flite battery failure.

- G2SF is powered by an external 6 Vdc power supply, provided by the remote control cabinet into which it is integrated.
- In its standard version (RS232 communication interface), G2SF has a total consumption of 26 mA (+ 30 mA by relay closed), including the short-range radio module standby consumption
- G2SF is not fitted with any battery backup; the backup comes from the remote control cabinet
- G2SF card is fitted with a double protection system, which prevents damage to:
  — the G2SF card, if the polarity is inverted on its +/- DC power connector, and
  — the external DC supply source, if the G2SF card is in short circuit (consumption exceeds 0.9 A).

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Dimensions

The G2SF is intended to be mounted inside an existing remote control cabinet.

Figure 14: G2SF—Dimensions of Cabinet and Mounting Holes

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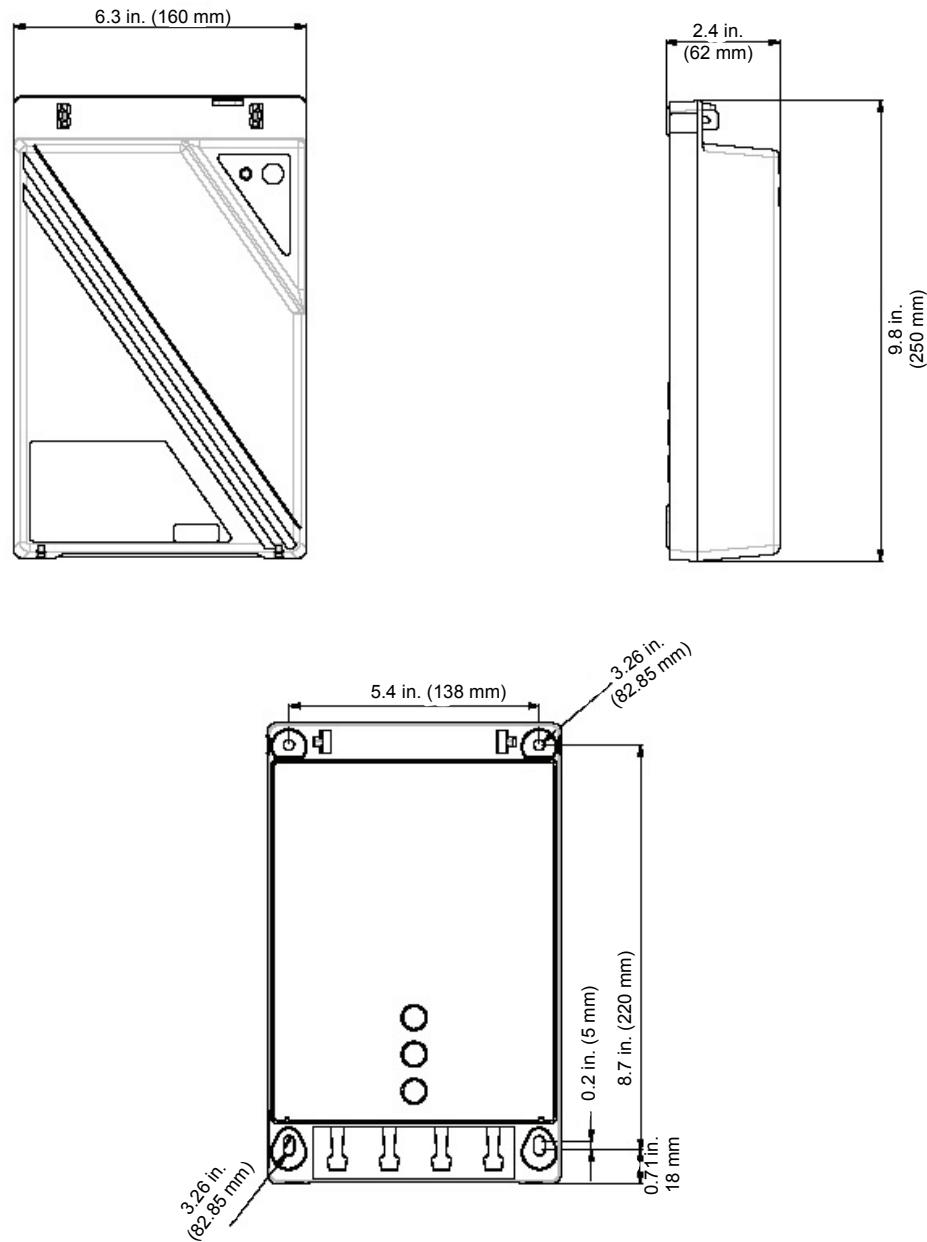
Section 3—Flite

Introduction

Figure 15:   Flite 116-SA

Flite 116-SA

Flite units are wireless, single-phase, fault passage indicators, also referred to as Faulted Circuit Fault Indicators (FCIs), for medium voltage distribution lines and load current measurement devices.

Flite units are fitted with the following components:

- Two sensors: one for MV voltage detection and one for current measurement.
- Short-range radio module
- An IP54, UV resistant envelope (PC/ABS)
- A transparent screen
- Eight high intensity red LEDs (for local fault display and test)
- Spring grips (to attach to the MV conductor line)
- A replaceable lithium battery (standard model)

Operations Performed

Fault Detection

Table 2:   Flite 116-SA Standard Configurations

Flite 116-SA
Di=60 A
Imax=800 A
Validation=ON (70 s)
Flash=2 hours
Inrush=ON (3 s)
Reset=ON (3 s)

When fitted with a standard configuration (see Table 2), the Flite will operate as described below.

Fault Detection

Once the MV line is established, the Flite units detect all sudden load current increases (di/dt) greater than 60 A and/or Imax level, occurring within 30 ms, immediately (within validation time) followed by a voltage dip lasting more than 300 ms. The voltage dip corresponds to the first opening of the upstream recloser. Once confirmed, Flite starts flashing and sends an alarm to the G200 hub.

When a recloser starts an open and reclosing sequence, all Flite units (located outside the path of the fault) filter the inrush current occurring during reclosings to avoid false fault detection.

Reset

If the recloser has cleared the fault, the MV voltage comes back for more than a given time (standard: 3 s), so Flite resets its flash and sends a "fault cleared" alarm to the G200 hub. If the recloser has **not** cleared the fault:

- Flite flashes for several hours in timer-reset mode (default setting: four hours), except if the fault is repaired and the line is re-energized before this time has elapsed. It stops flashing and sends a fault cleared alarm to the G200
- If the fault is not cleared and the operator cannot reclose the recloser, the Flite flash goes on.

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Table 3:   Flite Timing Diagram

Application		Flite 116-SA
DI/dt		OFF or 6, 12, 24, 30, 40, 60, or 80 A
Imax		100, 150, 200, 250, 300, 400, 500, 600, or 800 A
Inrush restraint	→	ON (3, 30, or 60 s) or OFF
Fault confirmation	→	ON (70 s) or OFF
Automatic voltage reset	→	ON (3, 30, or 70 s) or OFF
Automatic timer reset	→	2, 4, 8, or 16 hours
Fault delay trip	→	25 ms (60 Hz) 30 ms (50 Hz)

Figure 16:   Flite Timing Diagram
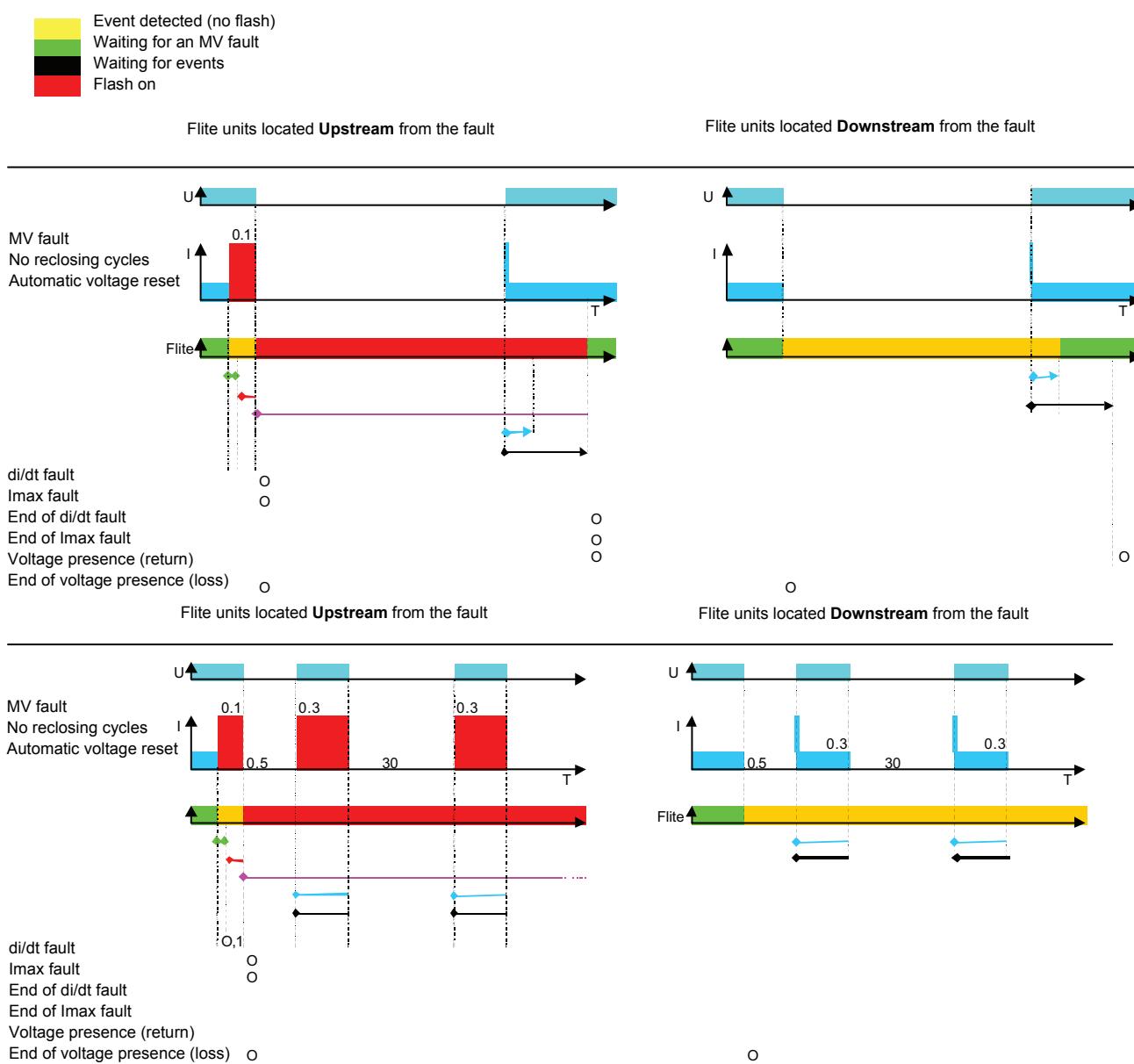
Functions

Line Monitoring

In parallel to the fault detection function, Flite performs a load current measurement (3–630 A), an immediate voltage loss detection, a regular check of the MV voltage presence or absence, and the voltage of the lithium battery.

Each Flite sends the following data collected to the G200 unit, every end of period (a period = 1 hour):

> **I_MAX**: maximum instantaneous current measured
> **I_MIN**: minimum instantaneous current measured
> **I_MEAN**: average current for the period
> FLITE battery status

Upon SCADA request (for instance, prior to switch loads), the G200 hub will ask all Flite units to send their instantaneous current measurement (I_INST). This is so the network operator can make sure that loads may be added to others.

By regularly downloading the I_MAX/I_MIN/I_MEAN measurements from each Flite, the SCADA operator has a clear view of the daily/weekly/yearly consumption on each phase on each MV line of the network.

Load Current Measurement

Flite 116-SA:

The principle remains the same with some improvements:

I_INST is a 3 s current measurement value sampled permanently.
I_MAX and I_MIN are re-evaluated every 3 s.
I_MEAN is the average of all I_INST values.

Lithium Battery Alarm

At the end of a period, each G200 hub knows which Flite unit is having a lithium battery problem. Once this information is forwarded to the SCADA or the maintenance center, the operator knows he has to plan a replacement for that Flite unit. **This prevents non-working fault indicators on the network.**

Short-Range Communication Alarm

Although the short-range communication G200-Flite units have been duly tested at the time of on-site installation, there may be new obstacles obstructing the direct line of sight needed for good communication (for example, growing trees, parked trucks, new fences, etc.).

This is why the G200 is fitted with a special counter, which records all unsuccessful communications to any Flite. When a user-set limit is overtaken, an alarm is sent to the SCADA or maintenance center requesting action.

MV Sag or Absence

The Flite 116-SA is permanently monitoring the medium voltage. As soon as a voltage dip occurs (even on single phase CB, recloser, or fuse operation), a radio alarm is sent in real-time to the G200.

Upon voltage return, at the end of the alarm, it is also sent to the G200, but it is 70 s delayed to avoid multiple radio alarms during reclosing cycles.

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Installation

Power Supply

Open the Flite's transparent cover and plug in the battery connector.

Figure 17:   Lithium Battery

Battery

Reset
Radio modem

Battery connector
for battery
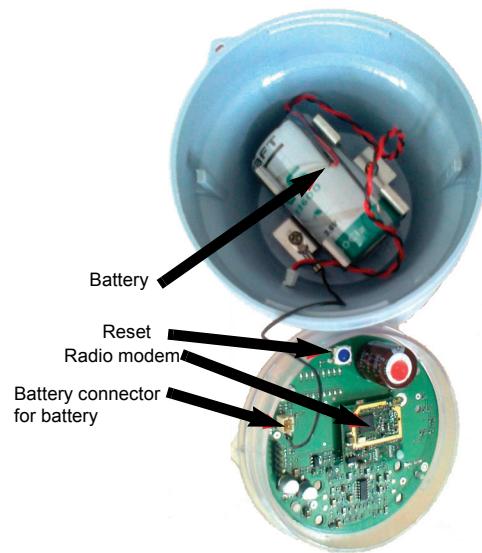
Test/Reset Feature and Maintenance

Using a magnet on the Flite generates the following actions:

	Flite 116-SA
FLASH is ON	Flite immediately resets
FLASH is OFF	Flite flashes for 20 s and sends Imax + di/dt alarms to the G200 in real time (useful for a demonstration)

Installation

Figure 18:   Flite Installation

MV conductor

Hook

Universal adapter
(bottom of installation
tool)

Hot stick
(mounting tool)
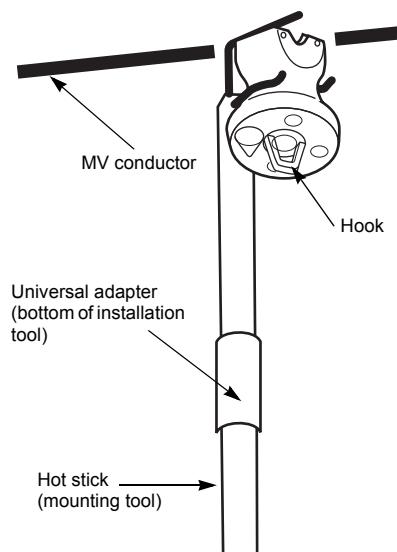
This may be done with gloves and an insulated bucket truck using standard security procedures for hot line working, or with the specific Flite 11X installation tool (model no. 59953) mounted on a hot stick (mounting tool) that is fitted with a universal adapter.

NOTE: The Flite 116-SA is fitted with a hook to use with the second mounting tool (shot-gun tool).

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Specifications

General Specifications

Table 4:   Flite General Specifications

Application	Flite 116-SA
Distribution lines	6 to 69 kV
Power frequency	50 and 60 Hz
HV/MV neutral arrangement	Solidly grounded, via a resistor or isolated
Fault detection on invert time protected lines	Yes
Conductor diameter	5 to 25 mm
Fault detection parameters (setting done remotely from the G200 or from SCADA)	
Di/dt	OFF, 6, 12, 24, 30, 40, 60, or 80 A
Imax	100, 150, 200, 250, 300, 400, 500, 600, 800 A
Inrush restraint	ON (3, 30, or 60 s) or OFF
Fault confirmation	ON (70 s) or OFF
Automatic voltage reset	ON (3, 30, or 70 s) or OFF
Automatic timer reset	2, 4, 8, or 16 hours
Voltage parameters (setting done remotely from the G200 or from SCADA)	
Electrical field used as voltage reference	9 or 18 kV/m
Local fault indication	
Visual signal	Red flashing light (8 high luminosity LEDs)
Flash frequency	20/ min
Flash duration per fault	2, 4, 8, or 16 hours (set by user)
Total flash duration (with the same battery)	400 hours
Short-range radio interface	
Frequency used	918–919.2 MHz according to FCC Part 15
Sensitivity	-110 dBm
Power supply	
Replaceable lithium battery	3.6 Vdc
Battery duration	10 years with 400 hours flash and 3 Flite units installed
Temperature/Current Parameters	
Operation temperature	-13 to 158 °F (-25 to 70 °C), -40 ° to 131 °F (-40 ° to +55 °C also available)
Humidity	<95%
Wind resistance	93 mile/hour (150 km/hour), same as Flite 110SA
Electro-magnetic compatibility	IEC
Short-circuit withstand	12.5 kA/1 s
Maximum load current	800 A
Shock tests	125 kV

Mechanical Specifications

The Flite 116-SA is protected by a weather proof envelope made of PC/ABS. The dimensions are listed in Table 5.

Table 5:   Mechanical Specifications

Net weight	1.2 lb (0.54 kg)
IP protection level	IP54 (NEMA 3)—IK7 (impact resistant)
Mounting	Spring grips

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Figure 19:   Weather Proof Envelope

5.11 in. (130 mm)

Ø 5.11 in. (130 mm)
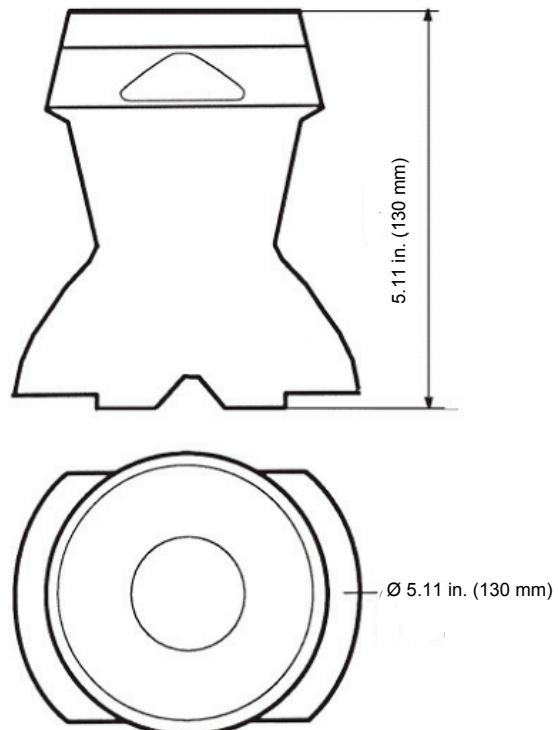
Section 4—Installation

Flite Installation

Introduction

When used in urban areas, many "natural" obstacles (vehicles, buildings, etc.) may disturb the radio signal between a G200 and its Flite units.

Diffraction, refraction, or diffusion phenomena can create areas of "shadows," interrupting message receptions at points close to the sender, while enabling a correct reception at a more distant point.

In addition, electromagnetic noise can affect communication performance: Avoid installing Flite units close to a high power radio or cellular relay.

See below for a list of rules to follow to ensure reliable radio communication.

Distance

Figure 20:   Placement of Flite Unit
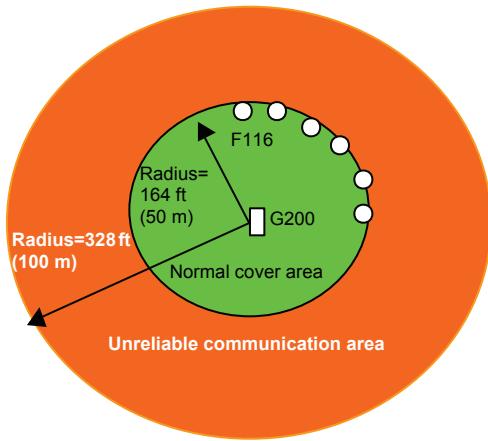
- All Flite units should be placed within a 164 to 328 ft (50 to 100 meters) radius around the G200 (although depending on local conditions, Flite units may successfully operate with no disturbance at even greater distances).
- The maximum distance between Flite units should be 100 meters.

G200 Installation

- If the pole is located along the road, install the G200 antenna above truck height
- Please note that noise is lower than -65 dBm on 902–928 MHz frequency range.

G200/Flite Orientation and Positioning of Antennas

- Place Flite units in the middle of the range rather than close to the pole
- Turn the G200 to the side of the Flite units that are furthest away
- Take care to distance the G200 antenna from metallic objects on the pole.
- Try to have a direct line of sight between the G200 and all Flite units
- Place the high power radio antenna (GSM, GPRS, CDMA, or radio) on the G200 (pole-mounted version) or of the RTU (card version) at least 6.6 ft (2 meters) from the G200 short-range radio antenna.

NOTE: Flite units are equipped with a broad band antenna, so they may be placed at any point around the relay, as long as no metallic obstacles obstruct the link.

ENGLISH

Distances between Flite Units Linked to Two Separate G200 Units[1]

- To avoid collisions, we recommended placing **two Flite units linked to two different G200 units** by more than 1.2 miles (1 km)

- Similarly, **two G200 units** must be separated by more than 1.2 miles (1 km)

To check the Flite unit's positioning, use the RSSI command in the **Flite Communication Parameters** menu (see description on page 41).

---

[1] On a future G200 software release, it will be possible to diminish this distance by selecting a different schedule for regular Flites-to-G200 communications.

Exclusion Zones

Figure 21:   Flite Exclusion Zones

Case 1: Good

D > .62 miles (1 km)

G200

FLITE116

Case 2: Wrong

D > .62 miles (1 km)

Case 3: Wrong

D > .62 miles (1 km)

ENGLISH
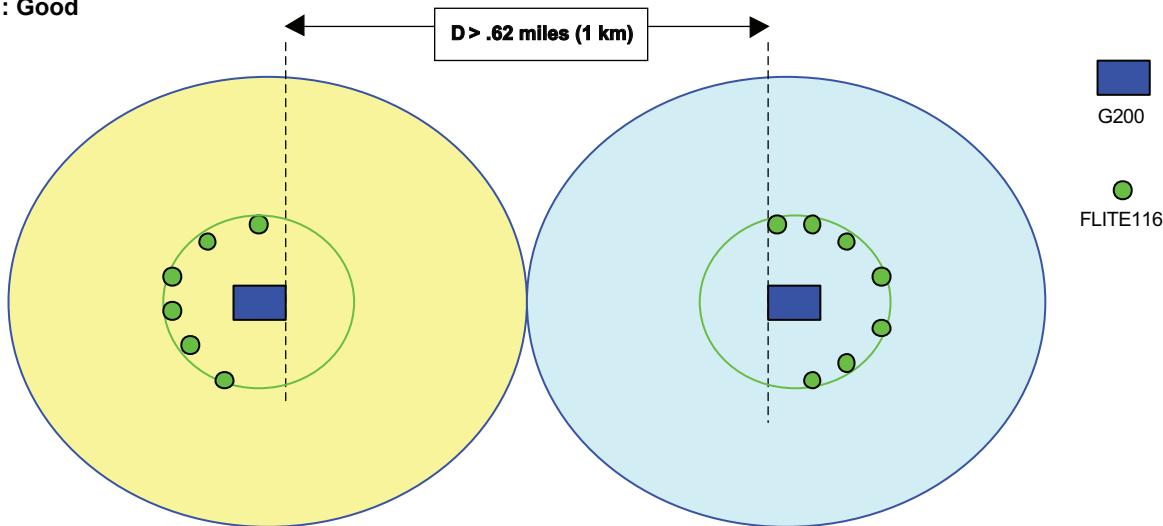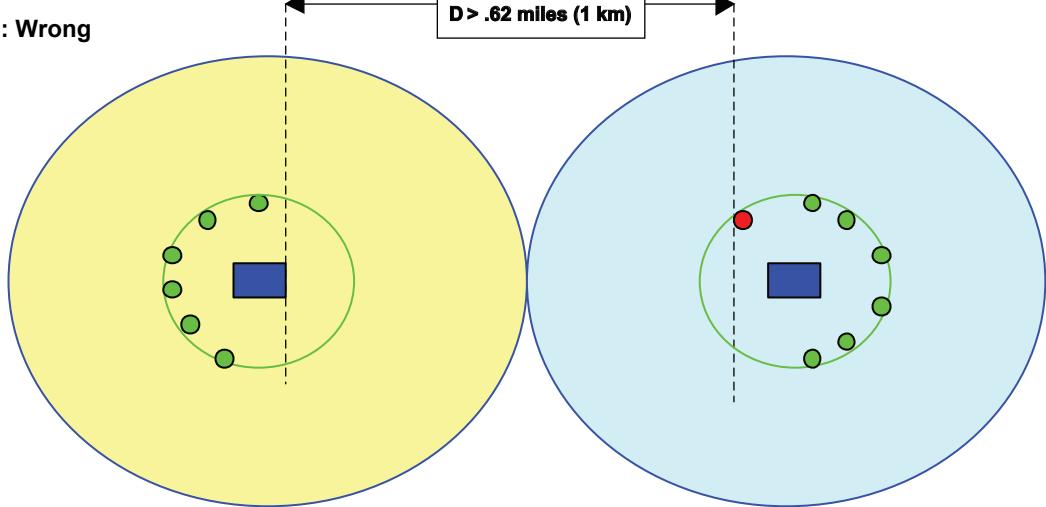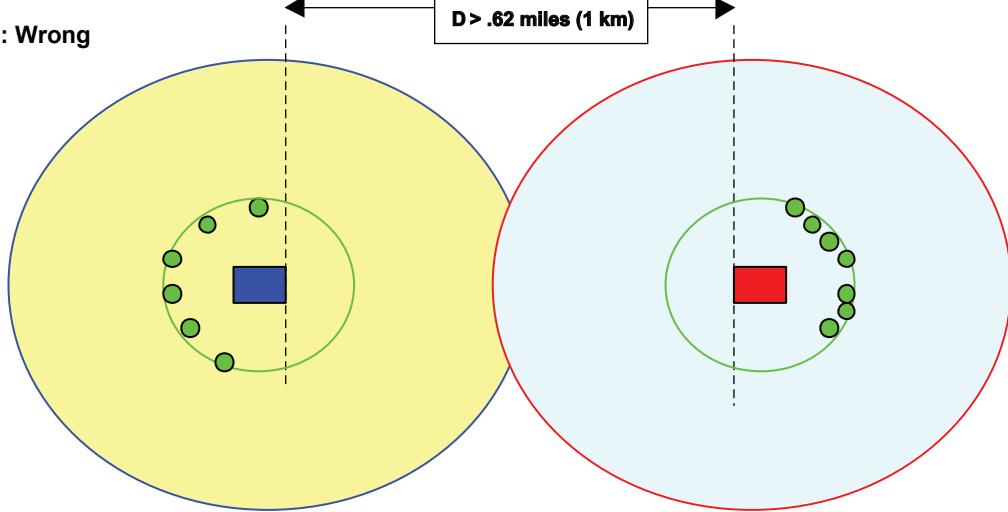
Radio or Cellular Antenna

The G200 cabinet (or the RTU to which it is linked per the RS232) may be fitted with a long-range radio interface (radio or cellular) to communicate with the SCADA.

This long-range radio interface has a stronger radio signal than the short-range radio used between the G200 and its attached Flite units, and may therefore disturb this link.

The long-range antenna must be placed on the opposite side of the pole where the G200 short-range antenna is installed.

The short-range radio partly uses 902–928 MHz bandwidth, so we recommend avoiding the same frequency on the long-range link. If you must use the same frequency, please contact your local Schneider Electric representative.

Figure 22:   SCADA Communication

ENGLISH
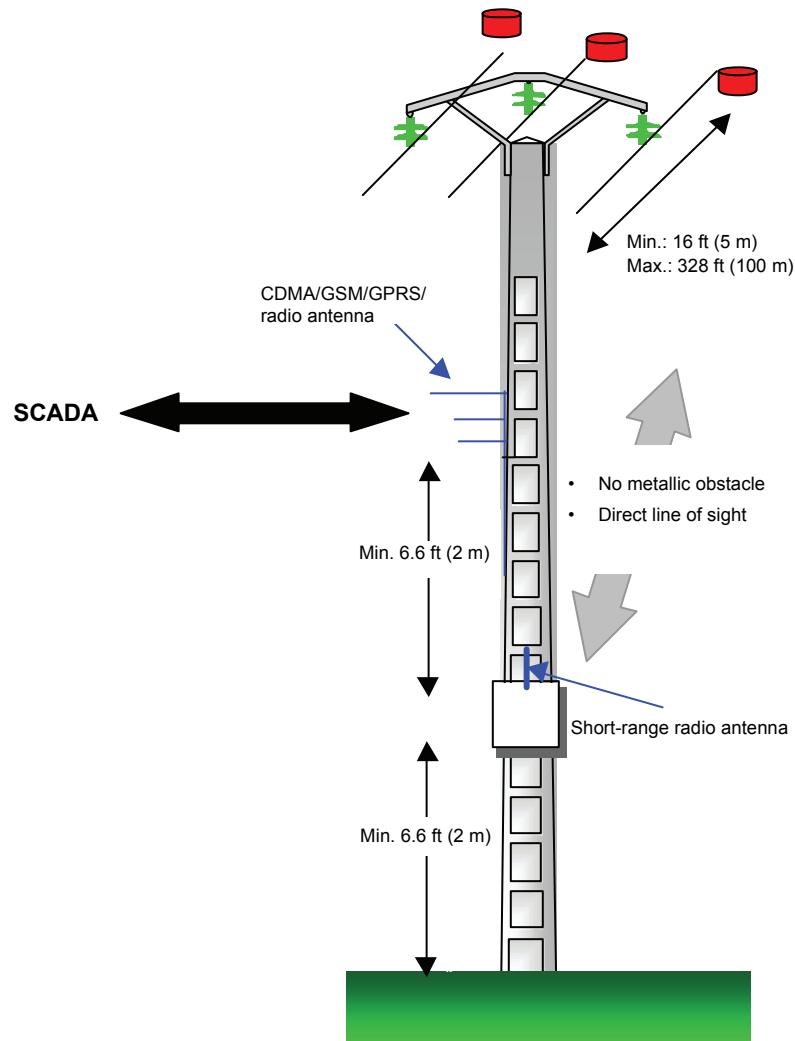
SIM Card for GSM/GPRS Communications

Introduction to GSM/GPRS Networks

G200 units may communicate to the SCADA or L500 hosts through various medias, among these are global system for mobile communications (GSM) for dial-up connections or general packet radio services (GPRS) using an IP address.

The G200 offer includes embedded GSM/GPRS interfaces as well as external GSM/GPRS modem devices. To operate, these interfaces or devices need a SIM card.

This SIM card is provided by your GSM/GPRS network provider and contains the required information to hook the G200 unit onto the GSM/GPRS network.

To insert the SIM card inside the G200 embedded GSM/GPRS interfaces or external GSM/GPRS devices.

SIM Card/GSM Antenna Installation

Figure 23:   Adding a SIM Card

SIM card holder
Card holder
Release button
Antenna connector (mmex type)
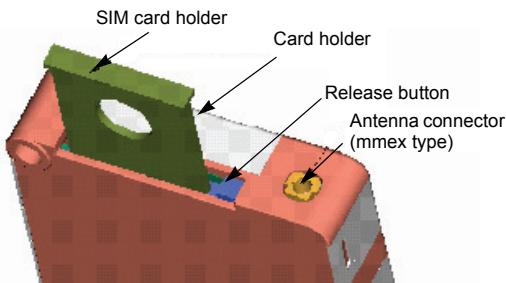
To add a SIM card, refer to the instructions below.

1. Power off the G200 unit.
2. Press the release button to unlock the SIM card holder.
3. Remove the card holder and place your SIM card.
4. Put the card holder back inside the GSM/GPRS device.
5. Connect the antenna to the GSM/GPRS modem.
6. Power the G200 unit again.
7. Check on a PC using the G200 configuration software that:

   — the modem is identified,
   — the GSM/GPRS radio signal is correct,
   — the SIM card is identified, and
   — the telephone numbers are correct.

NOTE: Write down the telephone number of your SIM card (to record it on the SCADA or on the L500).

G200 Mounting

G2PF

Cabinet Installation

The G2PF cabinet is meant to be mounted on any kind of pole (concrete, steel, or wood). Therefore, it is mounted using two stainless steel plates on the back (one on the top, one on the bottom).

For wooden poles:

- Screw for upper metal plate (1 x M6 screw*)
- Screw for lower metal plate (1 x M6 screw*)

(*) Other screw diameters available on request

If the service personnel prefer to use a hammer and nails, use the optional G200 mounting plate (see Figure 25). To install the mounting plate, see the instructions below.

First, the optional G200 mounting plate is to be installed on the pole. See instructions below and refer to Figure 25.

1. Using screws/nails, install the optional mounting plate on the pole.
2. Lift the G2PF unit (1)
3. Hook the G2PF upper metal plate inside the G200 mounting plate (2)
4. Using M6 screws, screw the G2PF lower metal plate into the G200 mounting plate hole (3) (other screw diameters available by request)

Figure 24:   G2PF Cabinet Installation

Upper metal plate

Lower metal plate

Figure 25:   G2PF Cabinet Installation with Optional G200 Mounting Plate

1

2

3
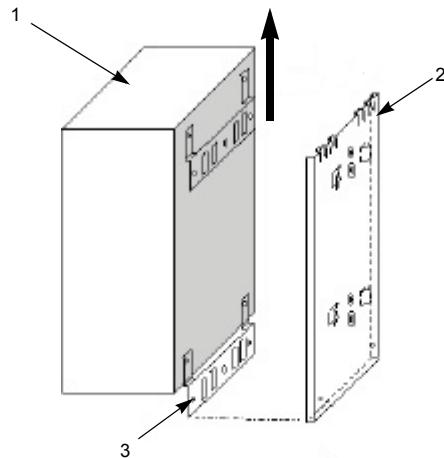
Powering the AC Unit

Figure 26:   G2PF AC Unit—Battery Installation

Nylon ties
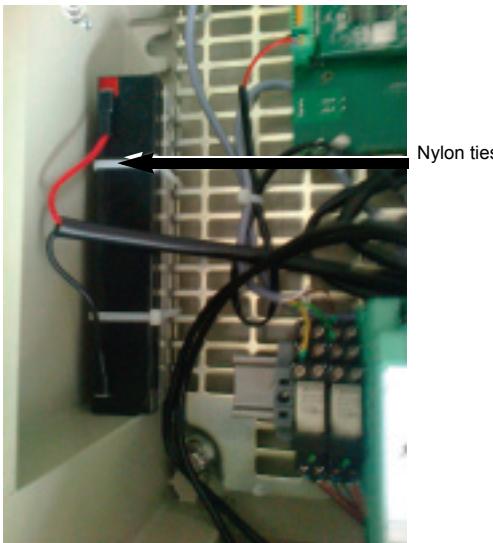
Figure 27:   LV Supply Connection

G200 LV input

HPC fuse holder

Incoming LV wire
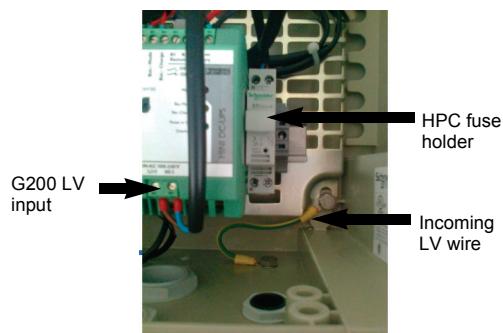
Battery Installation

NOTE: Do not connect the battery wire or plug until after the LV supply has been connected.

- The standard AC version of the G2PF is delivered with a 12 V–2 Ah battery (other battery versions are available on request)

- Install the battery inside the G2PF cabinet on the bottom left side (Figure 26) and secure it with nylon ties.

NOTE: The battery must be connected once the LV supply has been connected. Otherwise, it may have a shorter lifetime.

LV Supply Connection

- Ensure that the voltage is not greater than 264 Vac.

  NOTE: An incorrect voltage may damage the G2PF unit or make it inoperable.

- Open the HPC fuse holder protecting the LV input before connecting the LV wire to the G2PF unit.

- Once the LV wire is connected, close the HPC fuse holder; a red LED should be lit for a few seconds on the G200 card

- Connect the battery plug

ENGLISH

Figure 28:   Battery Connection onto Sockets

Battery connection

Phoenix LV
transformer
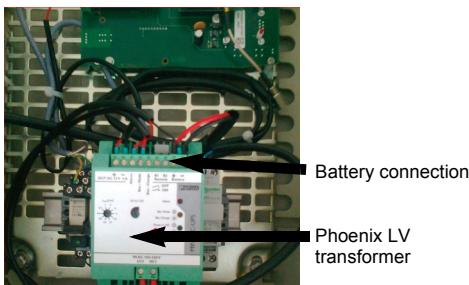
Battery Connection

Connect the battery to the equipment by screwing the two wires into the terminal blocks located on the phoenix LV transformer (see Figure 28).

NOTE: Connectors are polarized. **When installing connectors, do not make a bad connection.**

Figure 29:   Screw Connector
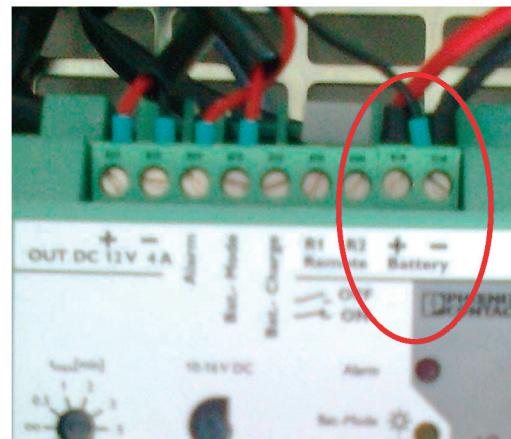
Normal Operation

Once the operations above have been carried out, the equipment is supplied for normal operation and allows battery charging.

ENGLISH

G2GF

- The G2GF is meant to be mounted on any kind of pole (concrete, steel, or wood).
- Since both power supply and battery backup are located outside the G2PF unit (inside the solar cell panel), there is nothing to do on this unit, except connecting the DC supply to the G200 card and the GSM antenna to the GSM card.

NOTE: As standard, the solar cell panel model no. GS612-10W includes a GSM patch antenna. So, the antenna cable and the DC cable are located inside a single cable of protection (linking the G2GF unit to the GS612-10W unit).

Optional GS612-10W

The optional GS612-10W solar cell panel has been designed to fit the power requirement of G2GF units fitted with our embedded GSM (or GPRS) card.

It is also possible to use it for the DC version of the G2PF unit, when the external modem used does not exceed the solar cell panel capacity.

Figure 30:   Solar Cell Panel

ENGLISH

G2SF

The G2SF unit is meant to be mounted inside the cabinet of an existing control cabinet with four screws (see Figure 31). The unit is fitted with four holes, enabling it to be screwed onto a metallic plate, such as Figure 32 below.

Figure 31:   G2SF Screw Holes
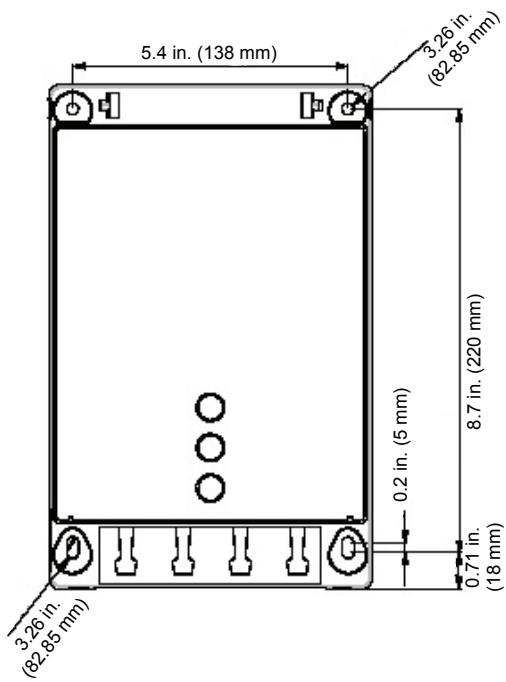
Figure 32:   G2SF Mounted in Cabinet

In this example of implementation, the G200 is delivered with the following four cables:

- a short-range antenna cable,
- a DC power supply + dry relay outputs,
- a communication cable, and
- a configuration cable.

Section 5—Commissioning

G200 Configuration Tools

Hardware Required

The equipment is configured using a computer with an MS DOS operating system and the following (provided) accessories:

- Easergy CD with "Easergy Configurator" software
- Connection cable

The pin and socket connector is cross-cable style.

NOTE: For a PC fitted without a RS232 port, an RS232/USB adapter is necessary.

Figure 33:   Example of DB9–DB9 Configuration Cable

Female connector on laptop side   Male connector on G200 side
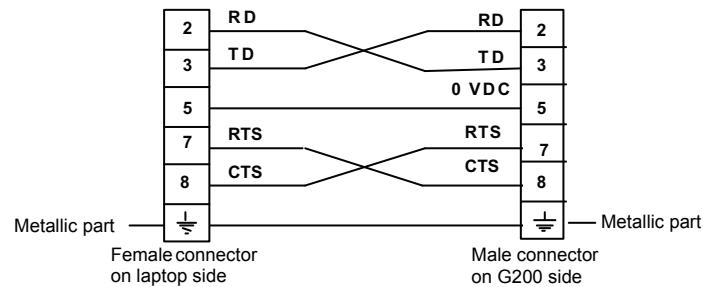
NOTE: The male-female cable is crossed.

Connecting the Computer

Plug the cord into serial port no. 1 (COM1) of the computer and into the connector on the front of the module (at the G200 end).

NOTE: On the G2GF, you can use the HARTING connector without opening the enclosure.

When the PC is on, insert the Easergy CD-ROM into the drive. After a moment, the software will run automatically (autorun function) and a window will appear on the screen.

In the menu, select "Other choice" and then select "Start" in the second menu. The Easergy Configurator will start automatically and the main menu will appear in a DOS screen.

Configuring the Unit

Important Note

To apply the modified data, press the **OK** zone. Until this is done, the equipment runs with the previous data, which is different from the data displayed on the screen.

- Pressing **Cancel** aborts the modifications and the default parameters are used
- The zone where the cursor is positioned is highlighted
- To move between the zones (data input fields or function title), use arrow keys or tabulation key
- To select a highlighted zone, use the **Enter** or **Space** keys

ENGLISH

- Parameter values are modified using:

  — the **+** or **Space** keys to increase the value, and
  — the **–** key to reduce the value.

NOTE: When a parameter value is at its maximum, pressing the **+** or **Space** key changes the value to its minimum. Pressing the **–** key changes the parameter value back to the maximum.

- To exit a sub-menu, press the **Escape** key.
- To exit the main menu, press the **Alt** and **F4** keys simultaneously.

Specific Messages

When the configuration software starts up, several types of messages may appear on the screen:

- **Unidentified equipment connected:** the serial link between the configuration computer and the equipment to be configured is not valid; check the connection cord and the connection location at the computer end
- **Fault messages:** related to a configuration loss or internal problem; refer to the "Maintenance" section on page 63

Software Configuration

Pressing the F10 key accesses the software configuration menu, which is used to modify:

- the display colors, and
- the serial port used.

CPU Configuration

G200 Main Menu

Equipment Name: Local name only used to access a hidden menu (reserved for the manufacturer)

Flite Identification: When selected, the G200 searches for all nearby Flite units and records their unique physical address (the process takes approximately two minutes)

Flite Communication Parameters: Gives access to the short-range radio the G200-Flite communication parameters

Parameters Flite x to y: Gives access to fault parameters of each Flite unit (referred to with a logical address 1–9)

For DNP3 only:

RTU Address: Source address used by the remote SCADA to identify this the G200 through the DNP3 protocol (adjustable from 0–65534)

SCADA Address: Destination address used by the G200 to identify the remote SCADA through the DNP 3.0 protocol (adjustable from 0–65534)

W500 Address: Not used

For IEC 101 only:

Link address: Permit to the SCADA to identify the G200 among all the far-end equipment.

Depending on the length of the link address field (1 or 2 octets), it can adopt all values between 0 and 254 or 0 and 65534.

Common address of ASDU: This address is generally not used by the G200, but the latter controls it.

In general, it is set to 0 (although the standard defines this value as "not used"), to 1, or to the same value as the *link address*.

Interoperability Transmission: Gives access to the protocol-related transmission parameter configuration screen

Interoperability Application: Gives access to the application configuration menu for the protocol.

Balanced mode: Gives access to the menu used to configure the transmission-specific elements in balanced mode.

For MODBUS only:

Modbus Address: Permit to the SCADA to identify the G200 among all the far-end equipment. Automatically define to 255 for GPRS transmission.

Figure 34: G200 Main Menu—DNP3 Protocol RS232 Modem Version

```
+--------- EASERGY - Configuration and Diagnostic - ALT+F4=Exit    ----------+
¦                        Easergy G200 DNP3 RS232                              ¦
¦                           PROM vx.xx                                        ¦
¦   EQUIPMENT NAME: ????????                                                  ¦
¦                                                                             ¦
¦   FLITE SETUP :                                                             ¦
¦     Flite Identification              Flite Communication Parameters        ¦
¦     Parameters Flite 1 to 6           Parameters Flite  7 to 9              ¦
¦                                                                             ¦
¦   DNP3 SETUP :                                                              ¦
¦     RTU address :       0   SCADA address    0   W500 address   0           ¦
¦     DNP3 Profile            Storage Parameters    Relay Parameters          ¦
¦                                                                             ¦
¦   COMMUNICATION SETUP :                                                     ¦
¦     Modem Slot 1 : Direct RS 232      Modem Slot 2 : Short Range Radio      ¦
¦     Communication Parameters                                                ¦
¦                                                                             ¦
¦                                                                             ¦
¦   SAVE CONFIGURATION :      OK                   Export                     ¦
¦                             Cancel               Import                     ¦
¦   DIAGNOSIS                                                                 ¦
¦     Display events          Erase events         Setup Time                 ¦
¦     Display analog          Equipment states                               ¦
¦     Flite counters          DNP3 analyser        RADIO analyser             ¦
+-----------------------------------------------------------------------------+
```

Figure 35: G200 Main Menu—IEC 101 Protocol Hayes Modem Version

```
        EASERGY - Configuration and Diagnostic - ALT+F4=Exit
                    Easergy G200 IEC 870-5-101
                         PROM vx.xx
   EQUIPMENT NAME: ????????

   FLITE SETUP:
     Flite Identification              Flite Communication Parameters
     Parameters Flite 1 to 6           Parameters Flite  7 to 9

   IEC 870-5-101 SETUP :
     Link address:       1             Common address of ASDU :  1
     Interoperability: Transmission    Application     Balanced mode
                       Alarm and Storage Parameters    Relay Parameters

   COMMUNICATION SETUP :
     Modem Slot 1 : Hayes              Modem Slot 2 : Short Range Radio
     Communication Parameters

   SAVE CONFIGURATION :      OK                   Export
                             Cancel               Import
   DIAGNOSIS
     Display events          Erase events         Setup Time
     Display analog          Equipment states
     Flite counters          DNP3 analyser        RADIO analyser
```

Figure 36: G200 Main Menu—Modbus Protocol GPRS Modem Version

```
        EASERGY - Configuration and Diagnostic - ALT+F4=Exit
                    Easergy G200 MODBUS GPRS
                         PROM vx.xx
   EQUIPMENT NAME: ????????

   FLITE SETUP :
     Flite Identification              Flite Communication Parameters
     Parameters Flite 1 to 6           Parameters Flite  7 to 9

   MODBUS Address : 255
     Alarm and Storage Parameters      Relay Parameters

   COMMUNICATION SETUP :
     Modem Slot 1 : GPRS               Modem Slot 2 : Short Range Radio
     GPRS Parameters
     Modbus TCP/IP parameters

   SAVE CONFIGURATION :      OK                   Export
                             Cancel               Import
   DIAGNOSIS
     Display events          Erase events         Setup Time
     Display analog          Equipment states
     Flite counters          DNP3 analyser        RADIO analyser
```

ENGLISH

Modem Slot 1:

- **Direct RS232:**
  - Direct RS232: Permanent link
  - Radio external: Radio link
- **MODEM HAYES (dial-up)**:
  - Hayes: for Hayes compatible modems
  - GSM: for AT commands, compatible GSM modems
- **MODEM GPRS**

  GPRS: For WAVECOM GPRS/GSM modems with embedded IP stack

Communications Parameters (DIRECT RS232 and DATA MODEM only): Gives access to long-range communication parameter settings

GPRS Parameters (GPRS MODEM only): Gives access to GPRS menu

TCP/IP Parameters (GPRS MODEM only): Gives access to TCP/IP menu

DNP3 Profile: Gives access to the DNP3 protocol menu

Alarm and Storage Parameters: Gives access to the alarms and the storage menu

NOTE: For RS232, the link is permanent so alarms have no use.

Relay Parameters (this menu is not available in all versions): Menu used to configure relay parameters

SAVE CONFIGURATION

OK: Request to confirm modifications of any data, both in the main menu and in the sub-menus

Cancel: All data that has been modified, but not yet confirmed, are cancelled–the equipment keeps the previous data, which is displayed again on the screen

Export: The configuration is copied in a file with a ".cfg" extension:

- All versions–FLITE.CFG: Flite parameters
- Direct RS232
  - G2DRS232.cfg: G200 parameters
  - com.cfg: long-range communication parameters
- MODEM DATA (dial-up)
  - G2DMOD.cfg: G200 parameters
  - com.cfg: long-range communication parameters

Figure 37: G200 Main Menu (Save Configuration)—DNP3 Protocol RS232 Modem Version

```
+--------- EASERGY - Configuration and Diagnostic - ALT+F4=Exit ----------+
¦                     Easergy G200 DNP3 RS232                              ¦
¦                          PROM vx.xx                                      ¦
¦   EQUIPMENT NAME: ????????                                              ¦
¦                                                                         ¦
¦   FLITE SETUP :                                                         ¦
¦     Flite Identification            Flite Communication Parameters      ¦
¦     Parameters Flite 1 to 6         Parameters Flite  7 to 9            ¦
¦                                                                         ¦
¦   DNP3 SETUP :                                                          ¦
¦     RTU address :      0  SCADA address    0   W500 address   0         ¦
¦     DNP3 Profile          Storage Parameters    Relay Parameters        ¦
¦                                                                         ¦
¦   COMMUNICATION SETUP :                                                 ¦
¦     Modem Slot 1 : Direct RS 232     Modem Slot 2 : Short Range Radio    ¦
¦     Communication Parameters                                           ¦
¦                                                                         ¦
¦                                                                         ¦
¦   SAVE CONFIGURATION :      OK                    Export                 ¦
¦                             Cancel                Import                 ¦
¦   DIAGNOSIS                                                             ¦
¦     Display events          Erase events         Setup Time             ¦
¦     Display analog          Equipment states                           ¦
¦     Flite counters          DNP3 analyser        RADIO analyser         ¦
+-------------------------------------------------------------------------+
```

Figure 38: G200 Main Menu (Save Configuration)—IEC Protocol HAYES Modem Version

```
        EASERGY - Configuration and Diagnostic - ALT+F4=Exit
                  Easergy G200 IEC 870-5-101
                          PROM vx.xx
    EQUIPMENT NAME: ????????

    FLITE SETUP:
      Flite Identification            Flite Communication Parameters
      Parameters Flite 1 to 6         Parameters Flite  7 to 9

    IEC 870-5-101 SETUP :
      Link address:       1              Common address of ASDU :  1
      Interoperability: Transmission    Application     Balanced mode
                        Alarm and Storage Parameters    Relay Parameters

    COMMUNICATION SETUP :
      Modem Slot 1 : Hayes              Modem Slot 2 : Short Range Radio
      Communication Parameters


    SAVE CONFIGURATION :      OK                    Export
                              Cancel                Import
    DIAGNOSIS
      Display events          Erase events          Setup Time
      Display analog          Equipment states
      Flite counters          DNP3 analyser         RADIO analyser
```

Figure 39: G200 Main Menu (Save Configuration)—Modbus Protocol GPRS Modem Version

```
        EASERGY - Configuration and Diagnostic - ALT+F4=Exit
                  Easergy G200 MODBUS GPRS
                          PROM vx.xx
    EQUIPMENT NAME: ????????

    FLITE SETUP :
      Flite Identification            Flite Communication Parameters
      Parameters Flite 1 to 6         Parameters Flite  7 to 9

    MODBUS Address : 255
      Alarm and Storage Parameters       Relay Parameters

    COMMUNICATION SETUP :
      Modem Slot 1 : GPRS               Modem Slot 2 : Short Range Radio
      GPRS Parameters
      Modbus TCP/IP parameters

    SAVE CONFIGURATION :      OK                    Export
                              Cancel                Import
    DIAGNOSIS
      Display events          Erase events          Setup Time
      Display analog          Equipment states
      Flite counters          DNP3 analyser         RADIO analyser
```

ENGLISH

- MODEM GPRS

  — G2DGPRS.CFG: G200 parameters

  — GPRS.cfg: G200 parameters

  — IP.cfg: TCP/IP parameters

Import: The configuration is imported from ".cfg file." If no ".cfg" file is present, the default configuration is applied

DIAGNOSIS

For more information on these choices, see the "Maintenance" section on page 63. "Time Setup" is discussed on page 50.

ENGLISH

G200 Long-Range Communication Settings

Direct RS232 Version

Host baud rate:

- Data communication speed between the SCADA and the G200
- Adjustable from 200 to 9,600 bps
- Default value: 9,600 bps

NOTE: For test purposes, it is better to select a low speed so it is easier to see exchanged messages between the SCADA and the G200 (see the section "Protocol Analysis" on page 65).

Parity:

Parity of the characters in send mode. Select "none," "space," "even," or "odd." If possible, choose even parity to ensure secure transmission.

Frame error on idle interval:

- Select "No" if the modem or the transmission can generate an interval of more than one bit between two characters. If "yes" is defined, the message will be rejected.
- Default value: "yes"

Handle DSR:

- Select "yes" if you want the G200 to detect connection using the DSR signal
- Default value: "no"

Handle CD:

- To make the G200 control reception with CD signal, select "yes"
- Default value: "no"

Delay before transmission:

- Some modems require a delay after receiving a message before being able to transmit another one. If the delay is too short (or if needed), the beginning of the message can be cut and a frame error can be generated
- Adjustable from 0 to 500 ms
- Default value: 00 ms

The following menus are used to set the long-range communication parameters (between the G200 and the remote control system).

NOTE: The setting is not exactly the same in this menu for all the different versions of protocol. Some parameters may not be present for all versions.

Figure 40: G200 Long-Range Comm. Settings—Direct RS232
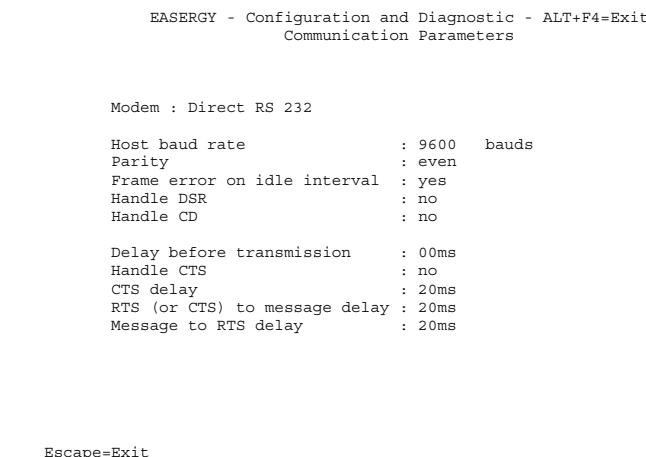
```
       EASERGY - Configuration and Diagnostic - ALT+F4=Exit
                    Communication Parameters


       Modem : Direct RS 232

       Host baud rate              : 9600   bauds
       Parity                      : even
       Frame error on idle interval : yes
       Handle DSR                  : no
       Handle CD                   : no

       Delay before transmission   : 00ms
       Handle CTS                  : no
       CTS delay                   : 20ms
       RTS (or CTS) to message delay : 20ms
       Message to RTS delay        : 20ms




    Escape=Exit
```

Handle CTS:

- To make the G200 wait for the CTS signal (after asserting the RTS signal) before sending the message, select "yes"
- Default value: "no"

CTS delay:

- The G200 delay waits until the CTS appears (if handled)
- Adjustable from 0–500 ms
- Default value: 20 ms

RTS (or CTS) to message delay:

- The G200 delay waits until after the RTS (or CTS, if handled) appears before sending the message
- Adjustable from 0–500 ms
- Default value: 20 ms

Message to RTS delay:

- The G200 delay waits until after the end of the message before asserting RTS low
- Adjustable from 0–500 ms
- Default value: 20 ms

ENGLISH

Radio (External Modem)

Figure 41: G200 Long-Range Comm. Settings—Range (External Modem)

Host baud rate:

- Data communication speed between the SCADA and the G200
- Adjustable from 200–9,600 bps
- Default value: 9,600 bps

NOTE: For test purposes, it is better to select a low speed so it is easier to see exchanged messages between the SCADA and the G200 (see the section "Protocol Analysis" on page 65).

```
+---------   EASERGY - Configuration and Diagnostic - ALT+F4=Exit   ----------+
|                         Communication Parameters                            |
|                                                                             |
|                                                                             |
|         Modem : Radio (external)                                            |
|                                                                             |
|         Host baud rate : 9600  bauds                                        |
|                                                                             |
|         DTR to RTS delay              : 20ms                                |
|         Handle CTS                    : no                                  |
|         CTS delay                     : 20ms                                |
|         RTS (or CTS) to message delay : 20ms                               |
|         Message to RTS delay          : 20ms                               |
|                                                                             |
|                                                                             |
|                                                                             |
|                                                                             |
|                                                                             |
|                                                                             |
|  Escape=Exit                                                                |
+-----------------------------------------------------------------------------+
```

DTR to RTS delay:

- The G200 delay waits until after asserting the DTR before setting the RTS to "1"
- Adjustable from 0–500 ms
- Default value: 20 ms

Handle CTS:

- To make the G200 wait for the CTS signal (after asserting the RTS signal) before sending the message, select "yes"
- Default value: "no"

CTS delay:

- The G200 delay waits until the CTS appears (if handled)
- Adjustable from 0–500 ms
- Default value: 20 ms

RTS (or CTS) to message delay:

- The G200 delay waits until after the RTS (or CTS, if handled) appears before sending the message
- Adjustable from 0–500 ms
- Default value: 20 ms

Message to RTS delay:

- The G200 delay waits until after the end of the message before asserting RTS low
- Adjustable from 0–500 ms
- Default value: 20 ms

Modem Hayes Version

Host baud rate:

- Data communication speed between SCADA and the G200
- Adjustable to 200, 300, 600,1,200, 2,400, 4,800, 9,600, or 19,200 bps
- Default value: 9600 bps (recommended)

Dialing type:

- Configurable to NO/TONE or PULSE (some PSTN modems require a PULSE dialing mode)
- Default value: no

Host tel number (main):

- SCADA main phone number: used to send the alarms to SCADA
- 15 digits maximum

Host tel number (standby):

- SCADA backup phone number: in case of no access using the main phone number)
- 15 digits maximum

Dial up delay time:

- Time-out delay is used for the alarms configured with a delayed option:
    — First attempt: adjustable from **0 to 1 min. per steps of 1 s**, setting it to "**0**" selects a random value between 0 and 1 min. (this is mandatory to prevent all equipment calling the SCADA simultaneously)
    — Second attempt: configurable from **0 to 5 min. per steps of 1 min.**, setting it to "**0**" selects a random value between 0 and 5 min.
    — Third attempt: configurable from **0 to 10 min, in steps of 1 min.**, setting it to "**0**" selects a random time between 0 and 10 min.

NOTE: The 2nd and 3rd attempts are only used if the preceding one (1st or 2nd one) did not manage to send the frame

Figure 42:   G200 Long-Range Comm. Settings—Modem Hayes

```
+--------      EASERGY - Configuration and Diagnostic - ALT+F4=Exit  ----------+
¦                     Communication Parameters                                 ¦
¦                                                                              ¦
¦  Modem : Hayes                                                               ¦
¦      Host baud rate : 9600   bauds                                           ¦
¦      Dialing type   : No                                                     ¦
¦                                                                              ¦
¦                                                                              ¦
¦      Host tel number (main)    : ??????????                                  ¦
¦      Host tel number (standby) : ??????????                                  ¦
¦                                                                              ¦
¦      Dial up delay time - first attempt  : 1s                               ¦
¦      (0s = random value) - second attempt : 1mn                             ¦
¦                         - third attempt  : 2mn                              ¦
¦                                                                              ¦
¦      Modem init : E0Q0V1&C1&D2S0=2                                           ¦
¦      Factory modem init                                                      ¦
¦                                                                              ¦
¦      Max transmission time - Answer Mode  : 2mn                             ¦
¦                           - Calling Mode : 20s                             ¦
¦                                                                              ¦
¦   Mode  :    SCADA                                                           ¦
¦                                                                              ¦
¦ Escape=Exit                                                                  ¦
+------------------------------------------------------------------------------+
```

Modem init:

- Initialization string sent to the modem equipment power up
- Selecting the factory modem init function resets this string to its default value
- Modem initialization sequence must do the modem operation as follows:
    — No echo
    — Turn on carrier detect signal when the remote carrier signal is present
    — Hang up when the DTR is low
    — Return basic (**OK, CONNECT, RING, NO CARRIER, ERROR, BUSY, NO ANSWER)** result codes as Word
    — Auto-answer

For a standard hayes modem, the default init string configure these settings.

Max transmission time:

- Maximum duration of a call, in answering mode or calling mode (alarm)
- On time-out expiration, the modem hangs up

Mode (three possibilities):

- **SCADA**: The G200 only communicates with a SCADA system (the address of the SCADA is configured in the main menu)
- **W500**: Not used
- **SCADA + W500**: Not used

ENGLISH

GSM Version

Host baud rate:

- Data communication speed between the SCADA and the G200
- **Must be set to 9,600 baud with a GSM modem** (mandatory data speed)

PIN code:

- Setting the PIN into the SIM card (default value is 000)
- In case a wrong PIN is entered, "GSM SIM card failure" appears in the screen **Equipment States**

NOTE: After three unsuccessful PIN operations, the SIM card is locked. To unlock it, a mobile phone set is needed (**the G200 cannot do it**). Please also refer to the SIM card user's guide to unlock it.

Modem parameters: see Hayes version

Short message system (enabled):

To get a SMS (short message) sent to a specific GSM cell phone (for instance, the service personnel's cell) upon alarm detection, select "yes"

NOTE: It is possible to have both an alarm sent to the SCADA and a SMS to a cell phone. The short message is sent first.

SMS service center phone number:

- Phone number of the SMS server
- Refer the SIM card's user guide for this phone number

NOTE: You may set the phone number in international format (for example "+336…" for a French cell phone number).

SMS user phone number:

GSM cell phone number of the person (service personnel) the SMS will be sent to

NOTE: You may set the phone number in international format (for example "+336…" for a French cell phone number).

Figure 43:   G200 Long-Range Comm. Settings—GSM

```
+---------      EASERGY - Configuration and Diagnostic - ALT+F4=Exit      ----------+
¦                        Communication Parameters                                   ¦
¦                                                                                   ¦
¦   Modem : GSM                                                                     ¦
¦        Host baud rate : 9600 bauds                                               ¦
¦        PIN code : 0000                                                           ¦
¦                                                                                   ¦
¦   Modem parameters                                                               ¦
¦                                                                                   ¦
¦        Host tel number (main)    : ??????????                                    ¦
¦        Host tel number (standby) : ??????????                                    ¦
¦                                                                                   ¦
¦        Dial up delay time  - first attempt  : 1s                                ¦
¦        (0s = random value) - second attempt : 1mn                               ¦
¦                            - third attempt  : 2mn                               ¦
¦        Max transmission time - Answer Mode  : 2mn                               ¦
¦                              - Calling Mode : 20s                               ¦
¦                                                                                   ¦
¦   Short message system : SMS                                                     ¦
¦        Short message system enable : no                                         ¦
¦        SMS service center phone number : ??????????                             ¦
¦        SMS user phone number : ??????????                                       ¦
¦   Mode :     SCADA                                                               ¦
¦ Escape=Exit                                                                      ¦
+-----------------------------------------------------------------------------------+
```

Mode (three possibilities):

- **SCADA**: The G200 only communicates with a SCADA system (the address of the SCADA is configured in the main menu)
- **W500**: Not used
- **SCADA + W500**: Not used

ENGLISH

Modem GPRS Version

PIN code:

• Setting the PIN into the SIM card (default value is 000)

• In case a wrong PIN is entered, "GSM SIM card failure" appears in the screen **Equipment States**

NOTE: After three unsuccessful PIN operations, the SIM card is locked. To unlock it, a mobile phone set is needed (**the G200 cannot do it**). Please also refer to the SIM card user's guide to unlock it.

APN Server: Enter the access point name (APN) given by your GPRS network provider

APN Login and Password: Enter the login and the password provided with your GPRS account

NOTE: In most cases, login and password are not required for GPRS access.

Time between connection attempt: The period of time between two connection attempts (in case the connection is lost)

Daily modem reset hour: In case the connection is lost, this function permits to recover the connection to the GPRS operator after a modem reset operation

NOTE: If "0h0" is defined, the daily modem reset is not activated.

Figure 44:   G200 Long-Range Comm. Settings—Modem GPRS

```
+---------     EASERGY - Configuration and Diagnostic - ALT+F4=Exit   ----------+
¦                         GPRS Parameters                                       ¦
¦                                                                               ¦
¦    SIM CARD PARAMETERS                                                        ¦
¦         PIN code : 0000                                                       ¦
¦                                                                               ¦
¦    GPRS COMMUNICATION PARAMETERS                                              ¦
¦         APN Server (Max 30 Digits)     :                                      ¦
¦         APN Login (Max 30 Digits)      :                                      ¦
¦         APN Password (Max 30 Digits)   :                                      ¦
¦                                                                               ¦
¦         Time between connection attempt : 30 mn                              ¦
¦                                                                               ¦
¦         Daily modem reset hour: 0 h 0                                         ¦
¦                                                                               ¦
¦                                                                               ¦
¦                                                                               ¦
¦                                                                               ¦
¦                                                                               ¦
¦                                                                               ¦
¦                                                                               ¦
¦                                                                               ¦
¦    Escape=Exit                                                                ¦
+-------------------------------------------------------------------------------+
```

ENGLISH

TCP/IP Parameters

Mode (only for DNP3 protocol):

- **SCADA**: The G200 only communicates with a SCADA system (the DNP 3.0 address of the SCADA is configured in the main menu)
- **W500**: Not used
- **SCADA + W500**: Not used

Host address (only for DNP3 protocol): The address of the G200 (acting as a host for IP) is automatically allocated

Listen mode (only for DNP3 protocol):

- To make the G200 stay in standby
- Select "yes" if you want the G200 to be in listen mode between connections (due to alarms)

Slave ID (only for Modbus protocol):

In Modbus protocol, slave identification must be designed to be able to send an alarm to the L500 in case the IP address has been changed from the operator (for dynamic address only)

NOTE: This address is only managed in case of L500 SCADA type. The same IP address must also be defined on L500 in the G200 setting.

Local port: Enter the port number you want the G200 to use to listen to the incoming connection; value is from 1–65535

Max transmission time and retry delay:

- Maximum duration of a TCP/IP connection, in answering mode or calling mode (alarm)
- On time-out expiration, the TCP/IP connection is closed
- Each time the G200 is receiving a request, the timer is reset

Figure 45: G200 Long-Range Comm. Settings—TCP/IP Parameters

```
          EASERGY - Configuration and Diagnostic - ALT+F4=Exit
                          TCP/IP parameters

   G200 PARAMETERS
       Mode                                 :    SCADA
       Host address(0.0.0.0 if dynamic)     :    0.0.0.0
       Listen mode                          :    yes

       Slave ID                             :    0
       Local port(1-65535)                  :    20000
       Max transmission time - Answer Mode  :    1mn
                             - Calling Mode:    20s
       TCP connect. delay  - 1st try        :    1s
       (0s = random value) - 2nd try        :    1mn
                           - 3rd try        :    2mn
   SCADA PARAMETERS
       IP address                           :    193.251.9.68
       Socket type                          :    TCP
       Remote port(1-65535)                 :    1163




   Escape=Exit
```

TCP/IP connect. delay:

Time to send an alarm configured with delayed option:

— First attempt: adjustable from **0 to 1 min. per steps of 1 s**, setting it to "**0**" selects a random value between 0 and 1 min. (this is mandatory to prevent all equipment calling the SCADA simultaneously)

— Second attempt: configurable from **0 to 5 min. per steps of 1 min.**, setting it to "**0**" selects a random value between 0 and 5 min.

— Third attempt: configurable from **0 to 10 min, in steps of 1 min.**, setting it to "**0**" selects a random time between 0 and 10 min.

NOTE: The 2nd and 3rd emissions are only used by the equipment (if the preceding one did not manage to send the frame).

SCADA Parameters:

- **IP address:** Destination IP address of the SCADA system
- **Socket type (only for DNP3 protocol):** Reserved for future use
- **Remote port:** Port number of the remote SCADA system, on which the SCADA system is listening to incoming connection from the G200 units

Time Setup

The equipment clock may be set by the configuration computer or automatically from the SCADA using protocol specific commands:

- **Automatic time setup:** The G200 automatically adjusts its date and time to the PC's date and time
- **Manual time setup:** The G200 clock is manually set by the user
- **Clock stop:** When the equipment is stored for a long period of time, we recommend stopping the clock to increase the service lifetime of the lithium battery (associated with the component that manages the clock)

NOTES:

1. The G200 is delivered with the clock stopped
2. The date and time are only used for dating time-stamped events and by the protocol analyzer

Figure 46:   G200 Long-Range Comm. Settings—Time Setup

```
+---------     EASERGY - Configuration and Diagnostic - ALT+F4=Exit   ----------+
¦                             Setup Time                                        ¦
¦                                                                              ¦
¦                                                                              ¦
¦        automatic Time setup        (from laptop)                            ¦
¦                                                                              ¦
¦        Date  : 10/11/04                                                      ¦
¦        Time  : 09:54:10                                                      ¦
¦                                                                              ¦
¦        Clock stop          (for an extended storage)                        ¦
¦                                                                              ¦
¦                                                                              ¦
¦                                                                              ¦
¦                                                                              ¦
¦                                                                              ¦
¦                                                                              ¦
¦                                                                              ¦
¦ Escape=Exit                                                                  ¦
+------------------------------------------------------------------------------+
```

Protocol Profile Settings for DNP 3.0

This menu is used to configure protocol specific parameters for **DNP 3.0**

LINK LAYER

Idle line delay:

- Minimum line idle interval between two consecutive frames
- Adjustable from 10–100 ms

Requires Data Link Confirm:

- To make the Link Layer send user data using a "SEND-CONFIRM EXPECTED" frame type, select "yes"
- To make the Link Layer send user data using a "SEND–NO REPLY EXPECTED" frame type, select "no"

NOTE: In case the "SEND–NO REPLY expected" frame type is used, the G200 will never send "RESET of remote link" frames. It shall strictly operate as a slave.

Maximum Data Link Re-tries:

- Number of times the Link Layer tries to resend its user data, when the RTU doesn't receive any "CONFIRM" frame (ACK or NACK) to a message using "SEND–CONFIRM EXPECTED" frame types
- When the Maximum Data Link re-tries is reached without confirmation, the Link Layer will perform "RESET OF REMOTE LINK" to re-initialize the link

Time-out:

- This is the delay that the Link Layer will wait for a "CONFIRM" frame after sending a "SEND–CONFIRM expected" frame
- Adjustable from 1 to 10 s

Delay before emission:

- Time-out delay before the first emission
- Sometimes the connection time can be longer on the SCADA than on the RTU
- This time-out delay must expire before the first emission is made (unsolicited response mode)

Figure 47:   G200 Long-Range Comm. Settings—Protocol Profile Settings

```
+---------      EASERGY - Configuration and Diagnostic - ALT+F4=Exit    ----------+
|                              DNP3 Profile                                       |
|                                                                                 |
|     LINK LAYER                                                                  |
|       Idle line delay                   : 10ms                                  |
|       Requires Data Link Confirm        : no                                    |
|       Maximum Data Link Re-tries        : 3                                     |
|       Time-out                          : 5s                                    |
|       Delay before emission             : 10s                                   |
|     APPLICATION LAYER                                                           |
|       Handle requested object(s) unknown bit: yes                               |
|       Sends Unsolicited Responses       : yes                                   |
|       Wait delay                        : 100ms                                 |
|       Requires Application Confirm      : no                                    |
|       Maximum Application Re-tries      : 3                                     |
|       Time-out                          : 1mn                                   |
|                                                                                 |
|                                                                                 |
|                                                                                 |
|                                                                                 |
|                                                                                 |
|  Escape=Exit                                                                    |
+--------------------------------------------------------------------------------+
```

APPLICATION LAYER

Handle requested object(s) unknown bit: If defined as "yes," the G200 will use a specific bit to indicate to the SCADA that the object required is unknown. If the SCADA doesn't support this function, configure to "No."

Sends Unsolicited Responses: Unsolicited responses are enabled if "yes" is selected

Wait delay:

- To limit the number of frames for unsolicited responses, it is possible to declare a time-out delay, so when an event occurs, the G200 waits for this time-out after this event before sending an unsolicited response
- This enables the G200 to see whether other events happen during the delay, and, if so, to send all events in the same unsolicited response
- This delay is adjustable from 0 ms to 5 s
- Select **0 ms** if you do not want to use this feature

Requires Application Confirm:

- To use the **Application Confirm,** select "yes"
- Normally, when **Sends Unsolicited Responses** is enabled, you have to enter "yes" (unless otherwise required)

Maximum Application Re-tries:

- Defines the number of re-tries by the application layer when the RTU doesn't receive any **Confirm** frame (application level) to a frame asking for an application confirmation
- When the maximum application re-tries is reached without confirmation, the G200 will stop sending the frame

Time-out:

- This is the length of delay that the Application Layer will wait for a **Confirm** frame (application level) after sending a frame asking for an application confirmation
- Adjustable from 1 to 5 min.

Protocol Profile Settings for IEC 101

This menu is used to configure protocol specific parameters for **IEC 101**

Link transmission procedure:

- Balanced correspond to master-master transmission or unbalanced to master-slave
- The default setting is "unbalanced"

Frame length (maximum length L):

- As specified in IEC 870-5-101. The values range from 11 to 255. Select a value less than 255 if shorter frames are required
- The default value is 255 octets

Single character I used as - ACK:

- Select "yes" to use the single character "I" (E5) as an ACK, otherwise a fixed-length frame is used
- In radio mode, "no" is recommended, as the character I (E5) is easily generated by noise.
- The default setting is "yes"

Single character I used as - NACK (requested data not available):

- Select "yes" to use the single character "I "(E5) as a NACK (requested data not available), otherwise a fixed-length frame is used
- In radio mode, "no" is recommended, as the character I (E5) is easily generated by noise.
- The default setting is "no"

Field length—Link address:

- Defines the length of the link address field (1 or 2 octets).
- The default value is 1

Field length—Common address of ASDU:

- Defines the length of the ASDU common address field (1 or 2 octets)
- The default value is 2

Field length—Information object address:

- Defines the length of the object information address field (1, 2, or 3 octets)
- The default value is 2

Field length—Cause of transmission:

- Defines the length of the cause of transmission field (1 or 2 octets)
- The default value is 1

Figure 33:   G200 Long-Range Comm. Settings—Protocol Profile Settings

```
       EASERGY - Configuration and Diagnostic - ALT+F4=Exit
                          Transmission

Link transmission procedure      : unbalanced
Frame length (maximum length L) : 255
Single character I used as :
  - ACK                          : yes
  - NACK (requested data not available)  : no
Field length :
  - Link address                 : 1  octet
  - Common address of ASDU       : 2  octet
  - Information object address   : 2  octet
  - Cause of transmission        : 1  octet
Information objects base addresses :
  - Orders                       :    1
  - Single indications           :   10
  - Measurements                 :  100
  - Flite parameters             :  160
  - Measure parameters           :  170
Variable structure qualifier : Sequence (SQ = 1) : enabled



Escape=Exit
```

Information objects base addresses—Orders:

The value of the information object addresses is the object type base address + relative address.

The relative addresses are given in the tables of G200 IEC101 protocol user guide, in the Information object addresses section. The base addresses can be defined by configuration. The following rules must be complied with:

- An object cannot have a null address.
- The addresses obtained must be less than the maximum possible value (255 for a 1-octet field, 65535 for a 2-octet field, and 16777215 for a 3-octet field)
- The addresses must be unique (no overlap between the address areas of different types, except in the case of commands)

Orders: The values can range from 0 to 255 and the default value is 1

Single indications: The values can range from 0 to 255 and the default value is 10

Measurements: The values can range from 0 to 255 and the default value is 100

Flite parameters: The values can range from 0 to 255 and the default value is 160

Measure parameters: The values can range from 0 to 255 and the default value is 170

Variable structure qualifier—Sequence (SQ = 1):

- When "enabled" is selected, the G200 tries to shorten the frames when the same types of objects are to be sent in a message.

  Detailed explanation: When SQ = 1 is enabled, the ASDUs (with the same TID and COT) are coded, when possible, as a sequence of information elements in an information object (SQ = 1), or as a sequence of information objects (SQ = 0) (for further details, see the M_SP_NA_1 coding in IEC 870-5-101, subclause 7.3.1.1). Since some PCs do not understand messages in which SQ = 1, this option can be disabled.

- The default option is "enabled"

This menu is used to configure protocol specific parameters for **IEC 101.**

Time tag type:

- This option is used to send spontaneous status changes without a time tag or with a time tag using binary time on 3 or 7 octets (CP24Time2a or CP56Time2a).

  For example, a single point change can be transmitted in the format ASDU M_SP_NA_1, M_SP_TA_1, or M_SP_TB_1, according to the option selected.

  NOTE: Binary time on 2 octets is not used.

- The default option is "7-octet binary time." Binary time on 3 octets consists only of minutes and milliseconds, whereas 7-octet binary time gives the year, month, day (of month), hours, minutes, and milliseconds.

Measured value type:

- Normally, IEC 101 provides "normalized" or "scaled"

- With G200, the only possibility is "scaled"

Command mode:

- Normally, IEC101 propose two options: "direct" and "Select and execute"

- With G200, the only possibility is "direct"

Measurements managed by GI:

- Define if the general interrogation from the SCADA includes the request of measurements

- The default setting is "yes"

Emission of End of initialization:

- Select "no" if you do not want the G200 to send an "End of initialization" (M_EI_NA_1) message after start-up (when the SCADA does not support this information).

- The default setting is "yes"

Figure 34:   G200 Long-Range Comm. Settings—Protocol Profile Settings

```
EASERGY - Configuration and Diagnostic - ALT+F4=Exit
                    Application




Time tag type            : 7 octet binary time

Measured value type      : scaled

Command mode             : direct

Measurements managed by GI               : yes

Emission of End of initialisation        : yes




Escape=Exit
```

This menu is used to configure protocol specific parameters for **IEC 101.**

BALANCED MODE ONLY

Station:

- As specified in IEC 870-5-101, RTUs are usually type B stations, but it may be necessary to declare them as type A

- The default setting is B

Time out:

- As specified in IEC 870-5-101, it can vary between 1 and 60 s

- The default value is 5 s

Maximum number of emissions:

- As specified in IEC 870-5-101, it includes the first transmission and the repetitions. It can vary between 1 and 10.

- The default value is 3

Data service:

- As specified in IEC 870-5-101, Send/Confirm or Send/No Reply

- The default setting is "Send/Confirm"

Broadcast command allowed:

- Normally, the broadcast command cannot be used in balanced mode. However, when the collision avoidance algorithm is enabled, the broadcast command can be used to reduce the number of messages exchanged. Select "yes" to use this additional option.

- The default setting is "no"

Figure 35: **G200 Long-Range Comm. Settings—Protocol Profile Settings**

```
EASERGY - Configuration and Diagnostic - ALT+F4=Exit
                  Balanced mode




Balanced mode only :
 - Station                   : B
 - Time out                  : 5s
 - Maximum number of emissions  : 3
 - Data service              : Send/Confirm
 - Broadcast command allowed   : no




Escape=Exit
```

Alarm and Storage Settings

This menu is used to configure the alarm parameters for the long-range communication (to the SCADA system) and storage parameters.

Alarm Parameters: Overall

Gives access to the general G200 alarm menu

Alarm Parameters: Flite information

Gives access to Flite alarms and events storage menu

Alarm Parameters: G200 information

Gives access to the G200 alarms and events storage menu

Figure 48:   G200 Long-Range Comm. Settings—Alarm and Storage Settings

```
+---------    EASERGY - Configuration and Diagnostic - ALT+F4=Exit   ----------+
¦                       Alarm and Storage Parameters                           ¦
¦                                                                              ¦
¦                                                                              ¦
¦                                                                              ¦
¦                                                                              ¦
¦         Alarms Parameters: Overall                                           ¦
¦                                                                              ¦
¦         Alarm Parameters : Flite information                                 ¦
¦                                                                              ¦
¦         Alarm Parameters : G200 information                                  ¦
¦                                                                              ¦
¦                                                                              ¦
¦                                                                              ¦
¦                                                                              ¦
¦                                                                              ¦
¦                                                                              ¦
¦ Escape=Exit                                                                  ¦
+------------------------------------------------------------------------------+
```

Alarm Parameters: Overall

This menu is used to configure automatic calls to the supervisor (SCADA).

Alarm message enabled:

- **Yes**: If a change of state of alarms and/ or switch position occurs, a call is made to the SCADA
- **No:** the G200 does not send any alarm message to the SCADA

Call Test:

- To test the long-range communication, select "yes"
- At the next configuration backup, the G200 shall issue a call to the SCADA

Automatic call:

- To issue a cyclic call to the SCADA, select "yes"
- Type in the start time (next time after backup), and the period (in hours)

Figure 49: **G200 Long-Range Comm. Settings—Alarm Parameters: Overall**

```
+---------      EASERGY – Configuration and Diagnostic - ALT+F4=Exit   ----------+
¦                       Alarms Parameters: Overall                               ¦
¦                                                                                ¦
¦                                                                                ¦
¦            Alarm message enabled   :              yes                          ¦
¦                                                                                ¦
¦            Call Test (write 1 only):              no                           ¦
¦                                                                                ¦
¦                                                                                ¦
¦                                                                                ¦
¦            Automatic call           :             no                           ¦
¦            Start time (h)           :             0                            ¦
¦                     (min)           :             15                           ¦
¦            Period (hours)           :             24                           ¦
¦                                                                                ¦
¦                                                                                ¦
¦                                                                                ¦
¦                                                                                ¦
¦                                                                                ¦
¦                                                                                ¦
¦ Escape=Exit                                                                    ¦
+--------------------------------------------------------------------------------+
```

Alarm Parameters: Flite Information

This menu is used to configure the alarm parameters and storage information for Flite events.

NOTE: For each parameter, the choice "Info in stack" is not available with Modbus protocol.

For each item, you can decide whether the corresponding event is:

- Alarmed, alarmed on bit set only, alarmed on bit clear only, or not alarmed
- Stored in the CLASS1 DNP3 stack (for DNP3 or IEC 101 only)

Di/dt: Alarm and storage of all di/dt faults detected by any Flite unit

Imax Fault: Alarm and storage of all Imax faults detected by any Flite unit

Flite batt. check: Alarm and storage of low battery alarm from any Flite unit

Volt. Presence (not for Modbus): Alarm and storage of MV trespassing according to selected voltage threshold

Flite Comm fault:

- Alarm and storage on Flite-G200 short-range communication faults
- An alarm is set when the preset number of successive Flite communications is greater than the selected threshold

Successive comm fault (before alarm)**:**

- Number of successive faults before the alarm (above) is set
- Adjustable from 1 to 4

Flite Presence (not for Modbus): Alarm and storage of Flite presence (a logical address is assigned to the Flite) or absence (the logical address is set to zero) events

Figure 50: **G200 Long-Range Comm. Settings—Alarm Parameters: Flite Information**

```
+---------      EASERGY - Configuration and Diagnostic - ALT+F4=Exit    ----------+
¦                    Alarm Parameters : Flite information                         ¦
¦                                                                                 ¦
¦                                 Info in stack             Alarm                 ¦
¦  dI/dt              :           Stored                    Not alarmed           ¦
¦  Imax               :           Stored                    Not alarmed           ¦
¦  Flite Batt. check  :           Stored                    Not alarmed           ¦
¦  Volt.Presence      :           Stored                    Not alarmed           ¦
¦                                                                                 ¦
¦  Flite Comm Fault   :           Stored                    Not alarmed           ¦
¦  Successive comm fault:                                   1   (before alarm)    ¦
¦  Flite Presence     :           Stored                    Not alarmed           ¦
¦  Config in progress :           Stored                    Not alarmed           ¦
¦  Config fault       :           Stored                    Not alarmed           ¦
¦  Deadband indication :                                    Not alarmed           ¦
¦                                                                                 ¦
¦                                                           DeadBand value        ¦
¦  Imean(A)           :           Stored                    10  Current(%)        ¦
¦  Imin(A)            :           Stored                    5   Min variation(A)   ¦
¦  Imax(A)            :           Stored                                          ¦
¦  Volt.(KV/m)        :           Not Stored                2   Voltage (KV/m)     ¦
¦                                                                                 ¦
¦  Escape=Exit                                                                    ¦
+---------------------------------------------------------------------------------+
```

Config in progress: Alarm and storage activation when a Flite configuration is in progress

Config fault: Alarm and storage activation when a Flite configuration failed

Deadband indication (not for Modbus): Alarm activation when the deadband threshold has been reached (I_MAX, I_MIN, I_MEAN, or Voltage)

DeadBand value for current measurement:

- Current (%): relative current variation required for storage
- Imin variation (A): minimum absolute variation that is required for storage

NOTE: To be stored, a current must increase or decrease in percentage above what is set in "Current (%)" **AND** increase in absolute value above what is set in "Min variation (A)."

Measured value deadband voltage (%): Deadband value for voltage availability; the minimum variation (between the last measurement sent to the SCADA and the new voltage measurement) that is taken into account

Alarm Parameters: G200 Information

NOTE: For each parameter, the choice "Info in stack" is not available with Modbus protocol.

Equipment Start: Alarm and storage of all the G200 starts/restarts

Conf:

• Alarm and storage of all local/remote configurations

• It is set to "0" for a local configuration and to "1" for a remote one

G200 IP address change (Modbus TCP/IP only):

Alarm and storage of IP address change occurrence (for dynamic IP address only)

DNP3 (or Modbus or IEC 101) Stack 80%:

• Alarm and storage of DNP3 stack 80% overflow occurrences

• When the DNP3 stack has reached 80% of its capacity, it may send an alarm to the SCADA to download the stack before any event loss occurs

Digital Input x: Alarm and storage of all digital input status changes

Figure 51: G200 Long-Range Comm. Settings—Alarm Parameters: G200 Information

```
+---------     EASERGY - Configuration and Diagnostic - ALT+F4=Exit   ----------+
¦                     Alarm Parameters : G200 information                        ¦
¦                        Info in stack      Alarmed                              ¦
¦                                                                                ¦
¦ Equipment Start      : Stored            Alarmed on bit set                    ¦
¦ Conf (local or remote): Not stored       Not alarmed                           ¦
¦                                                                                ¦
¦ G200 IP address change: Stored           Alarmed on bit set                    ¦
¦ DNP3 Stack 80%       : Stored            Alarmed on bit set                    ¦
¦                                                                                ¦
¦ Digital Input 1      : Not stored        Not alarmed                           ¦
¦ Digital Input 2      : Not stored        Not alarmed                           ¦
¦ Digital Input 3      : Not stored        Not alarmed                           ¦
¦ Digital Input 4      : Not stored        Not alarmed                           ¦
¦ Digital Input 5      : Not stored        Not alarmed                           ¦
¦ Digital Input 6      : Not stored        Not alarmed                           ¦
¦                                                                                ¦
¦                                                                                ¦
¦                                                                                ¦
¦                                                                                ¦
¦                                                                                ¦
¦                                                                                ¦
¦ Escape=Exit                                                                    ¦
+--------------------------------------------------------------------------------+
```

Relay Parameters

NOTE: The relay parameters depend on the version.

Relay activation: Permit to activate the use of relays. It is not recommended to use relays with solar panel power supply.

Each digital output relay may be assigned to one of the following actions:

- **Fault:** When a line fault occurs on any Flite, the DO closes; when all line faults are cleared, the DO opens

- **Com. fault:** When a short-range communication failure occurs on any Flite, the DO closes; when all communication failures are cleared, the DO opens

- **Bat. Fault:** When a battery failure occurs on any Flite, the DO closes; when all battery failures are cleared, the DO opens

- **Fault x:** If a line fault occurred on Flite number x (x=1,2, or 3), the DO closes; when the fault is cleared, the DO opens

Figure 52: G200 Long-Range Comm. Settings—Relay Parameters

```
+--------- EASERGY - Configuration and Diagnostic - ALT+F4=Exit  ----------+
¦                          Relay Parameters                                ¦
¦                                                                          ¦
¦    Relay activation: no (not recommended with solar panel power supply)  ¦
¦    Relay 1 : Fault                                                       ¦
¦    Relay 2 : Com.Fault                                                   ¦
¦    Relay 3 : Bat.Fault                                                   ¦
¦                                                                          ¦
¦                                                                          ¦
¦                                                                          ¦
¦                                                                          ¦
¦                                                                          ¦
¦                                                                          ¦
¦                                                                          ¦
¦                                                                          ¦
¦                                                                          ¦
¦                                                                          ¦
¦                                                                          ¦
¦                                                                          ¦
¦                                                                          ¦
¦ Escape=Exit                                                              ¦
+--------------------------------------------------------------------------+
```

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Flite Configuration

Short-Range Radio Communication Settings

This menu is used to configure the short-range radio communication between the G200 and the Flite units.

NOTE: During the first installation, it is mandatory to activate a Flite identification command (main menu) to update this menu.

Serial Number:

- Physical address (in hexadecimals, on six bytes) of the Flite units identified by the G200
- This list is updated by the **Flite identification** command in the main menu
- This field cannot be modified by the operator

NOTE: An FFFFFFFFFFFF value means that there is no corresponding Flite unit.

Wink: Command (signal) used to flash a Flite unit

RSSI Level:

- Means **Received Signal Strength Indication**
- Used to get information on the signal level received by Flite
- In correct conditions, it should be **greater than 30%**

Logical Address:

- Logical address that is used by the G200 to address the Flite units
- Adjustable from 0–9
- A Flite is considered as not present if its logical address is 0

NOTE: All Flite units must have a different logical address (from 1–9). For example, say that three Flite units have been detected:

- Flite on phase A = select "1" as its logical address
- Flite on phase B = select "2" as its logical address
- Flite on phase C = select "3" as its logical address

NOTE: Before using 10, 11, and 12 logical addresses, please check with your local Schneider Electric representative to validate whether your G200 version is able to operate with more than nine Flite units.

Figure 53: Flite Configuration—Short-Range Radio Communication Settings

```
+---------     EASERGY - Configuration and Diagnostic - ALT+F4=Exit    ----------+
¦                     Flite Communication Parameters                             ¦
¦                                                                                ¦
¦   Serial Number        Wink          RSSI Level       logical Address          ¦
¦                                                                                ¦
¦   012B043002C0         WINK          RSSI                1                      ¦
¦   012B043002D5         WINK          RSSI                2                      ¦
¦   012B04300315         WINK          RSSI                3                      ¦
¦   012B0430000B         WINK          RSSI                4                      ¦
¦   012B04300317         WINK          RSSI                5                      ¦
¦   012B043002C3         WINK          RSSI                6                      ¦
¦   012B043002CA         WINK          RSSI                7                      ¦
¦   012B043002CB         WINK          RSSI                8                      ¦
¦   012B0430031C         WINK          RSSI                9                      ¦
¦                                                                                ¦
¦                                                                                ¦
¦                                                            Get Flite Current   ¦
¦                                                            Get Flite Info      ¦
¦   Nota : an indicator is considered as missing if its logical address is 0.    ¦
¦                                                                                ¦
¦   Measuring period :  1 h                                                      ¦
¦                                                                                ¦
¦ Escape=Exit                                                                    ¦
+--------------------------------------------------------------------------------+
```

Measurement period:

- Period used by Flite for current measurement
- Adjustable to 2 min. (for test purpose only) or to 1 hour (standard operation)

Get Flite Current: Command to retrieve the latest I_INST current values from all Flite units (data available with display analog command)

Get Flite Info: Command to retrieve the latest communication counter values from all Flite units (data available with Flite counters)

Fault Detection Parameter Settings

These menus are used to configure the Flite fault detection parameters.

For each Flite unit, following parameters are adjustable:

- **DI/DT level:**
  - Minimum phase current variation threshold above which a fault is detected
  - Adjustable from 6–80 A or disabled
  - DT is automatically set to 30 ms (50 Hz) or 25 ms (60 Hz)

NOTE: The selected threshold may be set at any value (whatever the load current is). This is why a di/dt algorithm is preferred to an Imax algorithm, because you can apply the same value for the whole feeder substation.

- **Imax level:**
  - Minimum absolute phase current threshold above which a fault is detected
  - Adjustable from 100–800 A

NOTE: The selected threshold must be greater than the maximum load current in use on the conductor at the location where it is installed.

- **Auto. Reset**:
  - Time-out (length of delay) Flite waits after MV has returned before resetting the flash
  - Adjustable to 0, 2, 30, or 70 s
  - For automatic voltage reset or to OFF ("0")
 - For transient fault detection

NOTE: The Flite may be set to find all types of faults (permanent, transient, and self-extinguishable), depending on its parameter settings.

- **Flash time**:
  - Time-out after which flash is reset
  - Adjustable from 2 to 16 hours

Figure 54: **Flite Configuration—Fault Detection Parameter Settings**

```
+---------     EASERGY - Configuration and Diagnostic - ALT+F4=Exit    ----------+
¦                      Parameters Flite 1 to 6                                    ¦
¦                                                                                 ¦
¦                                                                                 ¦
¦                      Flite    Flite    Flite    Flite    Flite    Flite         ¦
¦                      n°1      n°2      n°3      n°4      n°5      n°6            ¦
¦                                                                                 ¦
¦   FAULT DETECTION                                                               ¦
¦    DI/DT level  :    60 A     60 A     60 A     60 A     60 A     60 A          ¦
¦    I max level  :    500 A    500 A    500 A    500 A    500 A    500 A         ¦
¦    auto. Reset  :    3 s      3 s      3 s      3 s      3 s      3 s           ¦
¦    Flash time   :    2 h      2 h      2 h      2 h      2 h      2 h           ¦
¦    Inrush       :    3 s      3 s      3 s      3 s      3 s      3 s           ¦
¦    Validation   :    5 s      5 s      5 s      5 s      5 s      5 s           ¦
¦    MV level (1) :    A        A        A        A        A        A             ¦
¦                                                                                 ¦
¦                                                                                 ¦
¦    (1):  A = KV/m, B = 18 KV:M                                                  ¦
¦                                                                                 ¦
¦ Escape=Exit                                                                     ¦
+--------------------------------------------------------------------------------+
```

- **Inrush**:
  - Used to filter inrush currents due to MV/LV transformers magnetizing currents upon line energizing
  - Adjustable to 3, 30, 60 s or to OFF (without)
  - Setting it to OFF means to de-activate the inrush filter (**not recommended**)

- **Validation**:
  - When set to ON, Flite must see a voltage dip within 70 s after the fault occurrence in order to confirm it
  - Setting it to OFF (without) may be useful for some specific applications

- **MV level:**
  - This is the electrical field that Flite must sense for all voltage operations (fault confirmation and automatic voltage reset)
  - Adjustable to 4 or 18 kV/m, depending on circuit situation (see drawing below)
  - A level: For single-circuit situation of MV line
  - B level: For multi-circuit situation of MV line
  - Default value: 4 kV/m

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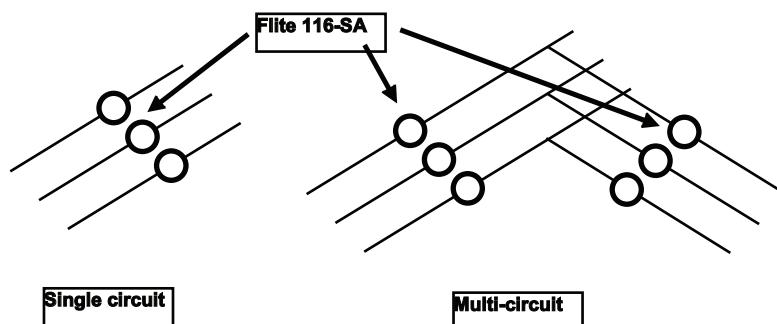
Section 6—Maintenance

Introduction

General Information

The equipment does not require regular maintenance.

It is essential to have a computer (or a PC compatible) and the Easergy CD-ROM (Easergy Configurator) for all equipment servicing.

Specific maintenance information, such as reading of internal equipment states and of stored events, is available only on this CD-ROM.

NOTE: Spare fuses are available in the accessory bags attached to the inside of the basic enclosure.

Connecting the Computer/Using the Software

See the section "Commissioning" on page 39.

Diagnostics

Equipment States

The equipment states menu is used to display information linked to the G200 and Flite unit's state.

G200 Information

- **Equipment fault:** The G200 encounters a configuration fault
- **Modem not identified:** The G200 was unable to communicate with the modem used
- **Alarm processing:** An alarm is being processed
- **GSM SIM card failure:** The G200 has detected the embedded GSM modem card, but cannot read the SIM card
- **Received signal:**
  — Shows the received signal strength indication of the GSM/GPRS modem
  — Should be above 16
- **Ip address (only GPRS):** The current G200 IP address

Flite Information

Fault Pres: Fault detected on Flite no. x

Bat. fault: Battery fault of Flite no. x

I av: Last received average load

I min: Last received minimum load

I max: Last received maximum load

MV Presence: Last received MV availability

Figure 36: Diagnostics: Equipment States—Hayes and RS232 Version

```
           Easergy - Configuration and Diagnostic - ALT+F4=Exit
                          Equipment states
   Equipment Fault  : no                    Modem not identified    no
   Alarm processing : no                    SIM card failure        no

   Modem state      : Modem Init...
   GSM signal quality:(must be > 16)
   received signal:  0              Max(31) - Not detectable(99)

    Fault  MV   Com.  Batt. Conf.  I ave    I min    I max     MV     Comm.
    Pres. Pres. Fault Fault Fault   (A)      (A)      (A)     (kV/m)  Qual(%)
  1  no    no    no    no    no      0        0        0        0        0
  2  no    no    no    no    no      0        0        0        0        0
  3  no    no    no    no    no      0        0        0        0        0
  4  no    no    no    no    no      0        0        0        0        0
  5  no    no    no    no    no      0        0        0        0        0
  6  no    no    no    no    no      0        0        0        0        0
  7  no    no    no    no    no      0        0        0        0        0
  8  no    no    no    no    no      0        0        0        0        0
  9  no    no    no    no    no      0        0        0        0        0


   ESCAPE=Exit
```

Comm. Qual: Quality of the radio communication (%) between the G200 and the Flite no. "x"

This indicator is regularly refreshed (measurement period) and must be 100%

NOTE: The counter is initially set to 100% at each configuration loading, then it is reduced gradually when measurements are not updated within each period (plus an additional two min. delay to take radio repeats into account).

Conf. Fault: Flite no. "x" configuration is not complete

Modem state: Indicates the current state of the modem

Figure 37:   Diagnostics: Equipment States—Modem GPRS

```
            Easergy - Configuration and Diagnostic - ALT+F4=Exit
                        Equipment states
    Equipment Fault   : no                    Modem not identified    no
    Alarm processing  : no                    SIM card failure        no

    Modem state       : ppp connected...      IP address : 192.168.12.6
    GSM signal quality:(must be > 16)
    received signal:  0                    Max(31) - Not detectable(99)

     Fault  MV   Com.  Batt. Conf.  I ave    I min    I max    MV      Comm.
     Pres. Pres. Fault Fault Fault   (A)      (A)      (A)    (kV/m)   Qual(%)
    1  no    no    no    no    no     0        0        0       0        0
    2  no    no    no    no    no     0        0        0       0        0
    3  no    no    no    no    no     0        0        0       0        0
    4  no    no    no    no    no     0        0        0       0        0
    5  no    no    no    no    no     0        0        0       0        0
    6  no    no    no    no    no     0        0        0       0        0
    7  no    no    no    no    no     0        0        0       0        0
    8  no    no    no    no    no     0        0        0       0        0
    9  no    no    no    no    no     0        0        0       0        0


    ESCAPE=Exit
```

Table 6:   Modem State Troubleshooting—Hayes Version

Modem State	Comments
Modem hang up	Standby state
Modem calling	—
Modem answering	—
Modem connected	—
Modem breaking	The modem is hanging up
Modem Init	the G200 is configuring the modem
Modem sending SMS	—
Code pin error	Wrong PIN used
Modem Init	the G200 is configuring the modem
Entering code pin	—
Code pin error	Wrong PIN used
Network registration	IMSI registration
GPRS registration	—
PDP Init	Opening a PDP session
PDP Closing	Closing the PDP session
PDP Status	Checking the PDP status
PDP Connected	Stand-by state when listen mode is not activated.
Closing TCP listened	Closing the listen port
TCP Closing	Disconnection from the SCADA
TCP Listening	Opening the listen port
TCP Listened	Stand-by state when listen mode is activated.
TCP Connecting	Connecting to the SCADA
TCP Connected	Connected to the SCADA
Modem failure	—
GSM registration denied	IMSI registration is refused by the operator (check your SIM card authorization with your provider)
GPRS registration denied	GPRS registration or PDP activation is refused by the operator (check your SIM card authorization with your provider)

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Protocol Analysis

This menu is used to analyze the data exchange on the long-distance connection with the SCADA.

The main causes of malfunction are:

- Absence of Supervisor–G200 dialogue, check:
  — Equipment power supply
  — State of transmission interface (modem)
  — Fault communication module

- Functional fault statements (such as remote controls not executed and remote indications not received), check:
  — Flite power supply
  — Flite-to-G200 communication (possible short-range radio disturbances)

Events Display

Figure 38:   Display Events

```
                 Display Events

 9  -  15/05/02  13:49:54.55 - Comm. Fault start Fl5
10  -  15/05/02  13:49:58.18 - Local configuration
11  -  15/05/02  13:51:11.54 - Fault IMax Fl11
12  -  15/05/02  13:52:53.83 - Fault IMax Fl10
13  -  15/05/02  13:54:15.53 - Comm. Fault start Fl4
14  -  15/05/02  13:54:15.80 - Comm. Fault stop Fl4
15  -  15/05/02  13:54:32.74 - Local configuration
16  -  15/05/02  13:55:12.54 - Comm. Fault start Fl4
17  -  15/05/02  13:55:54.54 - Comm. Fault stop Fl4
18  -  15/05/02  13:59:54.52 - Digital Input 5
19  -  15/05/02  13:01:54.53 - Local configuration
20  -  15/05/02  14:05:54.54 - Flite  config stop Fl1
21  -  15/05/02  14:07:54.56 - Flite  config start Fl1
22  -  18/05/02  10:26:48.08 – Equipment start
End of 22 events
ESCAPE=Exit
```

The **Display Events** menu is used to review stored time-stamped events locally.

- When all events have been displayed, their total number is indicated on the same line as the message "End of xx events." At that point, it is possible to move around the list using the arrow keys.

- 100 time-stamped events may be recorded. When this number is exceeded, the first event in the list is "Events loss."

- Events may be erased by selecting "Erase events" in the main menu. Confirmation is requested by "Confirm (Y/N)." Pressing the "Y" key permanently erases the time-stamped events.

Current Measurement Display

Figure 39:   Display Analog

```
                  Display analog
Instant Value (from get pic data)

 Adr   date             I

  1    00/00 00:00:00     0 A
  2    00/00 00:00:00     0 A
  3    00/00 00:00:00     0 A
  4    00/00 00:00:00     0 A
  5    00/00 00:00:00     0 A
  6    00/00 00:00:00     0 A
  7    00/00 00:00:00     0 A
  8    00/00 00:00:00     0 A
  9    00/00 00:00:00     0 A
 10    00/00 00:00:00     0 A
 11    00/00 00:00:00     0 A
 12    00/00 00:00:00     0 A

ESCAPE=Exit
```
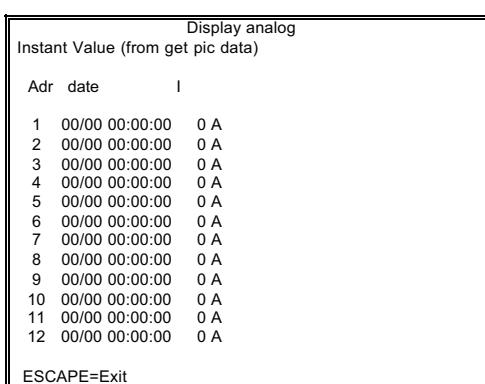
The **Display analog** menu is used to display the latest recorded I_INST values from all Flite units.

To refresh these values, use "GET PIC DATA" in the **Flite Communication Parameters** menu.

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Flite Radio Analysis

This menu is used to analyze the data exchange on the short-range radio link to each Flite unit. The main causes of malfunction are:

- Absence of Flite–G200 dialogue, check:
    - Equipment power supply
    - State of transmission interface (aerial, Flite position, etc.)
    - Flite power supply (Flite battery, …)
    - Start-up procedure

- Functional fault statements (remote controls not executed, remote indications not received), check:
    - Flite power supply
    - Communication with the Flite (possible short-range radio disturbances)

Flite Counters

Figure 40:   File Counters

```
+---------      EASERGY - Configuration and Diagnostic - ALT+F4=Exit   ----------+
¦                              Flite counters                                    ¦
¦                                                                                ¦
¦Communication Diagnose:                                                         ¦
¦                                                                                ¦
¦ FLITE           1    2    3    4    5    6    7    8    9                       ¦
¦                                                                                ¦
¦ Trs232         0%   0%   0%   0%   0%   0%   0%   0%   0%                       ¦
¦ Tradio         0%   0%   0%   0%   0%   0%   0%   0%   0%                       ¦
¦ Tapp           0%   0%   0%   0%   0%   0%   0%   0%   0%                       ¦
¦                                                                                ¦
¦                                                                                ¦
¦                                                                                ¦
¦                                                                                ¦
¦                                                                                ¦
¦                                                                                ¦
¦                                                                                ¦
¦                                                                                ¦
¦                                                                                ¦
¦                                                                                ¦
¦ ESCAPE=Exit                                                                    ¦
+--------------------------------------------------------------------------------+
```
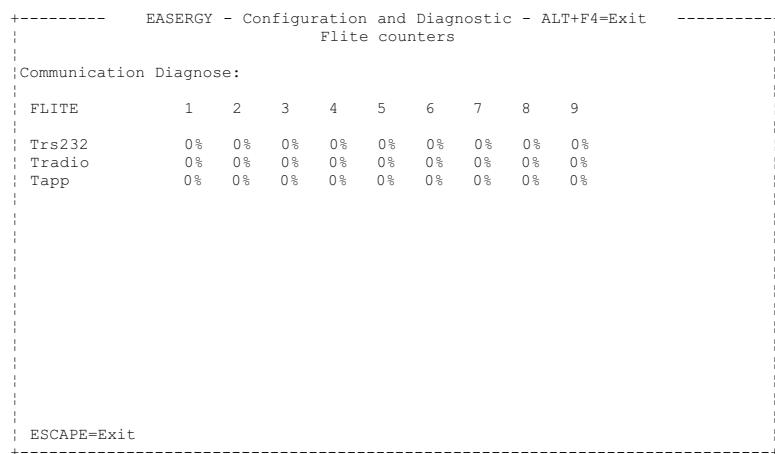
The **Flite counters** menu is used to display the counter's statistics from the Flite units. To refresh these values, use the **Get Flite info** command in the **Flite Communication Parameters** menu.

The Flite counters are:

- **Trs232:**
    - Acknowledges the rate of message sending on the serial port between the radio component and the PIC
    - The rate should be more than 80%

- **Tradio:**
    - The sending rate of message previously acknowledged
    - The rate should be 100%

- **Tapp:**
    - The application acknowledge rate
    - The rate should be more than 80%

If the resulting rate is lower than the one expected, it could be due to a hardware problem on the Flite unit. Replace the current Flite unit with a new unit and redo the test.

If the problem is still there, it could be due to a disturbed radio environment or a wrong installation. Please refer to the "Installation" section on page 29.

Easergy G200 Range Wireless Communication Indicator
Instruction Bulletin